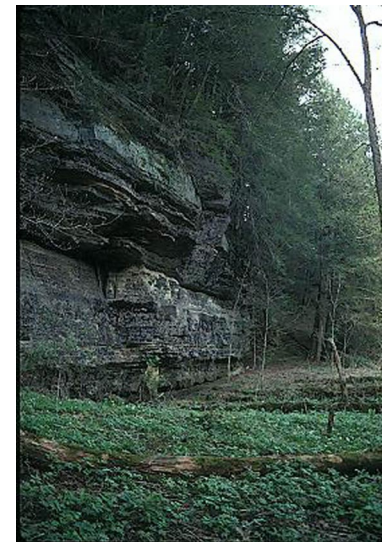


The State of the Lower Wisconsin River Basin

July 2002

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**A Report by the Wisconsin Department
of Natural Resources in Cooperation with the
Lower Wisconsin River Basin Partnership Team and Stakeholders.**



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To Interested Parties of the Lower Wisconsin River Basin:

The Lower Wisconsin River Basin is host to a wide variety of high quality natural resource areas that are worthy of protection and enhancement; from the vast Lower Wisconsin State Riverway to the tiny spring creeks that are home to wild populations of brook trout. We need to work together to assure that these many resources are protected for the use and enjoyment of our future generations.

The Lower Wisconsin State of the Basin Report was prepared in consultation with local units of government, other agencies, private citizens and other conservation organizations in the Lower Wisconsin River Basin. We hope that the goals, objectives and recommendations in this document will be useful in providing direction for future projects and work in the basin. It is also envisioned that this document, and the accompanying effort that went into its preparation, will serve as a springboard for a multitude of integrated resource management projects throughout the basin.

It is hoped that this report will help you understand basic aspects of our natural resources, how they interact and what issues need more attention. This will help provide direction for those of us who work and recreate in the basin and provide guidance concerning policy issues that need to be addressed in the future.

Sincerely,

Andy Morton
Lower Wisconsin River Basin
Water Leader

Rick Wojciak
Regional Forester

ACKNOWLEDGMENTS

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This plan also serves as an implementation component of Wisconsin's Fisheries, Habitat and Wildlife Strategic Implementation Plan.

ACRONYMS

BBS	Breeding Bird Survey
BMP	Best Management Practice
CAFO	Confined Animal Feeding Operation
COE	Corps of Engineers
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
DOA	Wisconsin Department of Agriculture
DOT	Wisconsin Department of Transportation
EQIP	Environmental Quality Incentives Program
ERW	Exceptional Resource Water
FACT	Farming and Conservation Together
FERC	Federal Energy Regulatory Commission
FIP	Forest Incentive Program
FSA	Farm Services Agency
LCD	Land Conservation Department
LUNKER	Little Underwater Neighborhood Keepers Encompassing Rheotactic Salmonids
LUST	Leaking Underground Storage Tanks
LWSR	Lower Wisconsin State Riverway
MTBE	Methyl tertiary-butyl ether
NHI	Natural Heritage Inventory
NRB	Natural Resources Board
NRCS	Natural Resources Conservation Service
ORW	Outstanding Resource Water
PWS	Priority Watershed Program
RC&D	Resource Conservation and Development
SDWA	Safe Drinking Water Act
TMDL	Total Maximum Daily Load
TRM	Targeted Runoff Management
TU	Trout Unlimited
USDA	United States Department of Agriculture
USEPA	United State Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
UWEX	University of Wisconsin-Extension
VOC	Volatile organic compound
VSN	Valley Stewardship Network
WDNR	Wisconsin Department of Natural Resources
WHIP	Wildlife Habitat Incentive Program
WPDES	Wisconsin Pollutant Discharge Elimination System
WRP	Wetland Reserve Program
WWTP	Wastewater treatment plant

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WHAT IS THE STATE OF THE BASIN REPORT AND WHY IS IT IMPORTANT?

The Lower Wisconsin River Basin State of the Basin Report provides a snapshot of the current health and status of land and water resources throughout the basin. This overall assessment of the resources includes a discussion of the issues and threats that face the basin's resources. Some of these threats and issues are unique to the basin, but others, such as nonpoint source pollution and stormwater runoff, are issues statewide. The report provides a vehicle for establishing a consistent process of identifying resource needs, priorities, and joint work plans for addressing these issues. It identifies the most important resource needs within the basin, and prioritizes goals and objectives for meeting those needs.

This report was developed locally, within the context of the WDNR's long-range resource goals. Key documents that were considered include the WDNR's Mission Statement, Strategic Plan, Strategic Implementation Plan and the Fisheries, Wildlife and Habitat Management Plan for Wisconsin for 2001 through 2007 (FWH), and the Lower Wisconsin Areawide Water Quality Management Plan, developed under NR121.

This document is a formal update to the Lower Wisconsin Areawide Water Quality Management Plan and serves as the legal umbrella to which related plans and studies are formally amended, such as sewer service area plans, stormwater studies financed through state funding sources, and other related documents such as priority watershed plans or grant project reports. This plan also serves as the implementation component of the state's Fish and Wildlife Strategic Plan.

Public Involvement

Public input is a key component to the development of the State of the Basin Report. The WDNR is interested in hearing what natural resources issues are of concern and of interest to residents in the Lower Wisconsin River Basin. To do this, the WDNR held three separate public informational meetings to gather the ideas of residents in the basin. The meetings were held in April and May of 2001 in Richland Center, Dodgeville and Baraboo. Among the most common concerns voiced were:

- ◆ water quality and the impact of nonpoint sources of pollution;
- ◆ the loss of habitat and habitat fragmentation (often due to development);
- ◆ the spread of non-native and invasive species;
- ◆ soil erosion as a result of development and agriculture;
- ◆ and recreation (providing for a variety of recreational opportunities)

The respondents also identified potential tools that could help to address these resource concerns; including education, monitoring, an increase in funding sources, and increased enforcement. For more information, please see Appendix A.

The issues identified by the public are addressed throughout the State of the Basin Report. In addition to identifying these problems, this report serves to organize and prioritize the issues and management decisions for the natural resources in the basin. An additional goal of the State of the Basin Report is to increase the cooperation between various state, local and federal agencies in resource management in the basin and to increase public involvement in management decisions and actions.

THE WATERSHED APPROACH TO NATURAL RESOURCES MANAGEMENT: INTEGRATION OF WATER AND LAND RESOURCES

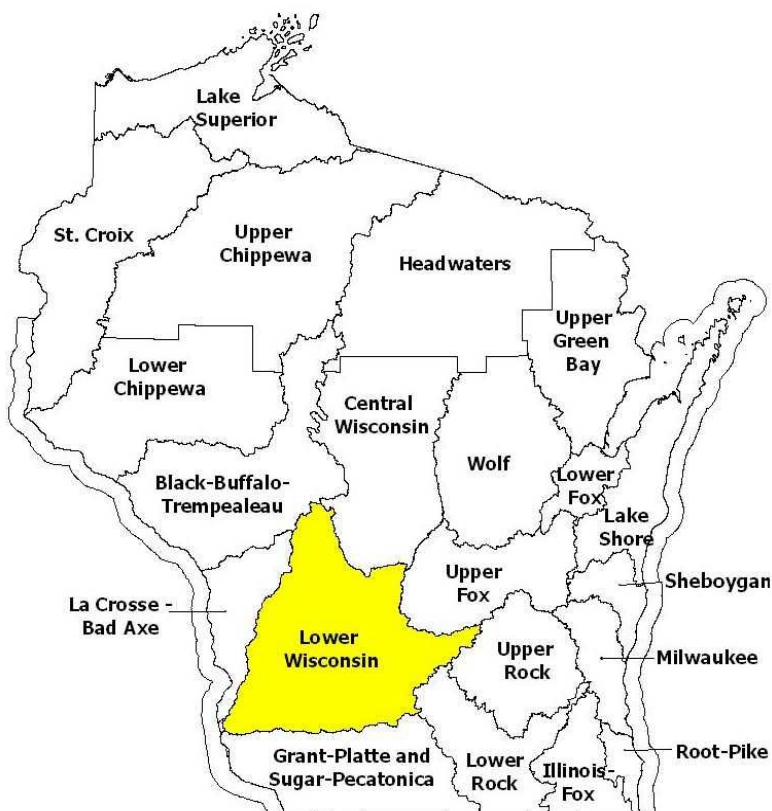
When considering how to manage the vast natural resources throughout the state of Wisconsin, the WDNR has realized that to be most effective, natural resources should be managed through an integrated, or “ecosystem,” approach by bringing together multiple agencies, interests and jurisdictions. Through this approach, all parts of the ecosystem are considered when addressing resource concerns – the land and land uses, surface and groundwater, and the plants, animals and people using the resources. Effective resource management requires an understanding of the interaction between all components in that ecosystem. Through the cooperation of staff in the WDNR’s various programs and by working with other agencies, groups and landowners, the WDNR has a long history of managing resources through this ecosystem approach.

To help facilitate this type of management, the state has been divided into river ecosystems or basins. A river basin consists of one or two main streams (first-order), and all of their tributaries. All of the land that drains to these streams is a part of the river’s drainage basin. All of the activities that take place on the land, from agriculture to urbanization and preservation to utilization of natural resources can affect the health of the land and the water in that basin.

Map 1: Major Management Units in Wisconsin

The Lower Wisconsin River Basin is just one of thirty-two major river systems in the state. The state has been subdivided into 23 Geographic Management Units (GMU’s). Each of these GMU’s has a team of resource professionals that work on the natural resource management issues in that unit. The Lower Wisconsin GMU has the same boundaries as the hydrologic basin of the Lower Wisconsin River.

Map 1: Major Management Units in Wisconsin



Map 2: Watersheds in the Lower Wisconsin River Basin

CHAPTER 1: PARTNERSHIP EFFORTS IN THE LOWER WISCONSIN RIVER BASIN

Effective management of natural resources is also reliant upon the cooperation between all stakeholders. Through partnering, it often becomes easier and more successful to work on natural resource projects.

There are a variety of exciting projects currently going on in the Lower Wisconsin River Basin. These projects address various resource issues in the basin that relate to land and water and rely upon the interagency cooperation and the involvement of the public and non-profit organizations. These projects are often funded by grants from state and federal agencies.

BADGER ARMY AMMUNITION PLANT

Badger Army Ammunition Plant is a World War II vintage propellant and ammunition manufacturing plant that operated during WW II, the Korean War and Vietnam. The facility has been maintained in a stand-by mode until two years ago when the army announced that the plant is no longer needed for production purposes. During the years of production, several sites around the facility have been used for various modes of disposal. Contaminants of concern include volatile organic compounds (VOC's), heavy metals and explosives. Remedial systems are in place at a number of the sites while other sites are still in the planning and implementation phases.

The disposal of waste products at the plant site has led to groundwater contamination problems and sediment contamination, particularly in Gruber's Grove Bay in Lake Wisconsin. The dredging and removal of contaminated sediments in Gruber's Grove Bay was completed during the fall of 2001. Since the removal, the WDNR, U.S. Army Corps of Engineers, Stone & Webster, Inc. and the U.S. Army plan to try to restore fisheries habitat in the bay. A preliminary plan is to restore rooted aquatic plants, planting shoreline trees in the water and fish crib deployment. Plans for the remediation of dredge spoils on the banks of Final Creek (wastewater settling ponds) have also been submitted to the WDNR. Soil and groundwater clean-up is taking place at other sites within the boundaries of the plant (Ales, 2001).

With the announcement that the plant is no longer needed, the title to the land will be transferred to other entities. The Ho-Chunk Nation, U.S. Dairy Forage Research Center, and the State of Wisconsin have expressed interest in future ownership and/or management at Badger. Also, Sauk County has worked over the last year to develop a community based consensus plan called the Badger Reuse Plan. The cornerstone of the Reuse Plan is to collaboratively manage the entire site as a single unit. The plan calls for conservation, restoration, recreation and agriculture. Work is currently underway by the three parties mentioned above to collectively work toward realizing the vision of the Reuse Plan. In general, the parties support large scale restoration of savanna and prairie, protecting the ecological transition between the Baraboo Hills and the Sauk Prairie and preserving and enhancing the ecological corridor between the Baraboo Hills and the Wisconsin River for ecological and recreation purposes (Degen, 2001).

For more information on the Reuse Plan
<http://www.co.sauk.wi.us/>

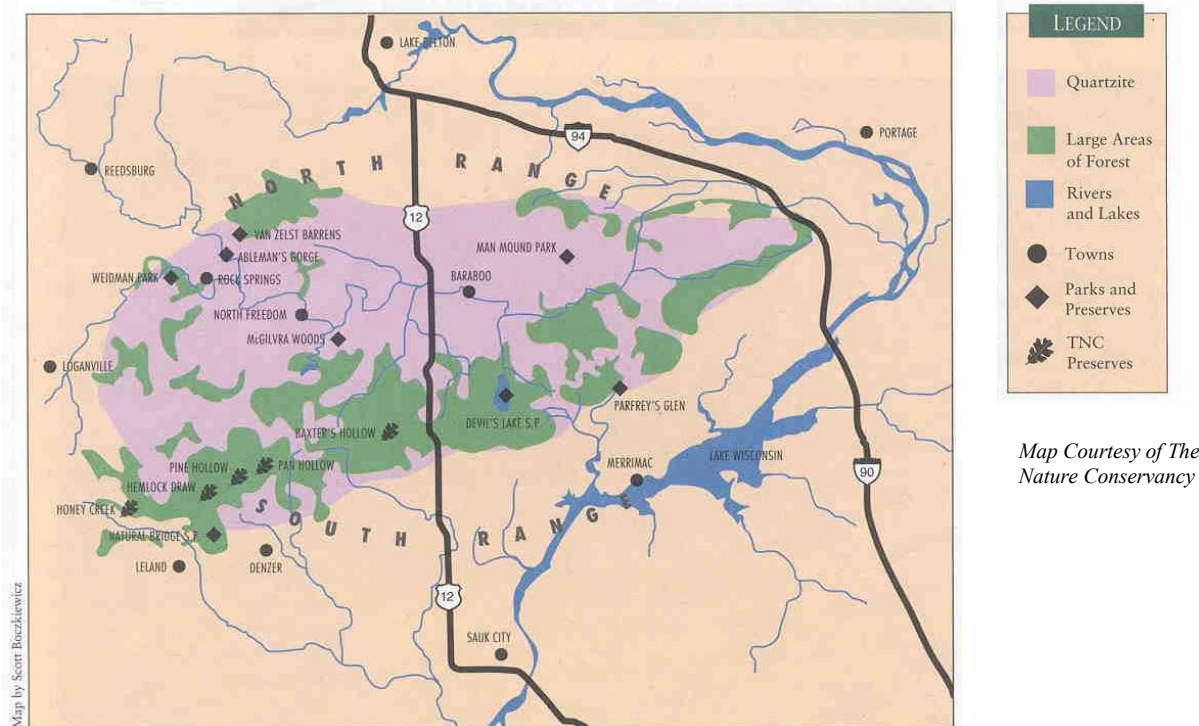
BARABOO HILLS

The Baraboo Hills are an ecologically unique part of the Midwest, defined by the quartzite outcrop that forms the Hills and has been designated as a National Natural Landmark (Map 3). The Baraboo Hills cover 144,000 acres in the midst of an area that has been primarily cleared for agriculture and home building. The rocky terrain and the thin soils of the hills has helped to protect the hills from development. The Baraboo Hills have many different micro-climates ranging from the warm and sunny hilltops and rocky cliffs to the cool, moist gorges and stream valleys. Because of these diverse and numerous climates, the Baraboo Hills provide habitat for more than 1,800 different kinds of plants, birds, fish, insects, mammals, snakes and frogs. The Hills also harbor more than half of Wisconsin's native vascular plants. The forest of the Hills is mostly deciduous, however, mixed in the woods are hillside pineries, damp hemlock forest and glades where sun-loving prairie species make their home. Oak savanna, now the rarest plant community in the Midwest, can still be found in the Baraboo Hills.

Due to its location, the Baraboo Hills are feeling increased pressures from Wisconsin's growing population. With this knowledge, the Nature Conservancy recently designated the Baraboo Hills as a "Last Great Place" in an attempt to protect one of the world's remaining outstanding ecosystems.

Some areas of the Baraboo Hills are publicly owned such as Devil's Lake and Parfrey's Glen and other areas, such as Baxter's Hollow, are owned by the Nature Conservancy or other private citizens or organizations. These lands, however are not enough to protect the great diversity of the Hills. As a result, the Nature Conservancy, in partnership with the WDNR, landowners in the area, and organizations like the Baraboo Range Preservation Association and the counties, have been working together to protect as much of this natural feature as they can. More landowner support and involvement is needed to protect other pieces of this Last Great Place (Nature Conservancy, date unknown).

Map 3: Baraboo Hills



BARABOO RIVER RESTORATION

The Baraboo River flows approximately 120 miles from its headwaters near Hillsboro to its confluence with the Wisconsin River south of Portage. Its watershed encompasses 650 square miles and drops over 150 feet in elevation, losing 45 feet as it flows through the City of Baraboo. This concentration of relatively steep gradient was recognized by early settlers for its potential to generate mechanical power and in 1837 dam construction began in this reach of the river, including; (Map 4)

- ◆ The former Linen Mill Dam. Removed in October 2001 by the WDNR, Sand County Foundation, River Alliance and the USFWS.
- ◆ The former Waterworks Dam. Removed in April, 1998 through partnerships between the City of Baraboo, WDNR, the State Historical Society, the Circus World Museum and River Alliance.
- ◆ The former Oak Street Dam. Removed in 1999. Alliant Energy assisted with the removal of coal tar deposits discovered in the bed of the river. Partners included the City of Baraboo, WDNR, River Alliance, Sauk County and the USFWS.
- ◆ The former LaValle Dam. Removed in 2001 through partnerships between the Sand County Foundation, the USFWS, NRCS, WDNR, Sauk County, and the residents of LaValle.

These dams had a negative effect on the river ecosystems of the Baraboo and Wisconsin Rivers by restricting the movement of game and forage fish species from the Wisconsin River system into the upper reaches of the Baraboo River. In addition, the dams on the Baraboo River blocked valuable spawning and nursery areas for fish migrating from the Wisconsin River. This habitat fragmentation transformed the rapids from a fast-moving stream with healthy fish populations to a series of sluggish impoundments. These millponds deteriorated substantially as a result of sediment loading, poor water quality, and degraded aquatic habitat.

In response to the river's importance as a fishery, the degraded quality of the millponds and the deterioration of the dams, many agencies, non-profit groups and citizens removed the dams on the Baraboo River, and are working to restore and enhance aquatic and riparian habitat and wetlands. The Baraboo River Restoration Project is focused on several main goals:

- ◆ Allow fish to assume historic spawning migrations.
- ◆ Restore in-stream habitat to coarse gravel deposits on bars and spits with cobble and boulder riffle and pools to enable fish to use the area for feeding, spawning and rearing, and as permanent habitat.
- ◆ Restore and enhance riparian habitat.
- ◆ Transport sediment in the former millponds downstream or remove mechanically.
- ◆ Restore steep gradient reach of the river to restore riffle areas and improve aeration for increased dissolved oxygen in the water column.

Monitoring has shown that the dam removal has helped to restore the river from shallow, sluggish impoundments to faster moving, riverine habitat. This restoration has also had a positive impact on fish and macroinvertebrate communities. The WDNR plans to continue to monitor the river to track continued changes in the macroinvertebrate community and in-stream habitat (Morton, 2000-2001, Stanley, et. al. 2002). Partners involved include WDNR, USFWS, NRCS, Sauk County, City of Baraboo, Village of LaValle, UW-Steven's Point, State Historical Society, Sand County Foundation, River Alliance, Circus World Museum, Citizens for Waterfront Revitalization, Baraboo River Canoe Club.

Map 4: Location of Former Dams on the Baraboo River

BLACK EARTH CREEK WATERSHED

The Black Earth Creek Watershed lies in western Dane County and the northeast corner of Iowa County. The watershed is largely dominated by agriculture, although the eastern edge of the watershed is increasingly seeing residential and commercial development. Black Earth Creek is a highly productive aquatic ecosystem and supports a naturally reproducing brown trout population. The stream has been rated as one of the best 100 trout streams in the nation by Trout Unlimited.

The stream is threatened by sources of nonpoint source pollution and was determined by the state to be a Priority Watershed Project. During the duration of the project, one hundred and eight landowners signed cost-share agreements for the installation of conservation practices to address some of the water quality threats to the creek. The project's pollutant load reduction goals were exceeded by an average of 61% and in some cases project goals were exceeded by as much as 89%.

Despite the success of the Priority Watershed Project, the creek continues to be threatened by rural sources of nonpoint pollution, increasing development, urban stormwater, construction site erosion and increased groundwater withdrawal. It is thought that these problems led to a fish kill in the creek during the summer of 2001.

The Dane County LCD, in cooperation with the USEPA and USGS are studying the water quality impacts from an 80-acre development that surrounds a stretch of Brewery Creek. Study sites both up and downstream have been selected to verify runoff from the construction along the creek.

In addition to the work being done by federal, state and local agencies, private landowners and other interested individuals have formed two non-profit organizations to help watch over the resources in the Black Earth Creek Watershed. The Black Earth Creek Watershed Association (BECWA) is a grassroots organization whose goals include protecting, conserving and advocating for the wise management of the Black Earth Creek. The Black Earth Creek Conservation Organization (BECCO) is also a grassroots organization whose mission is to protect, enhance, restore, and celebrate the unique geological, aesthetic, historical and biological features of the Black Earth Creek



Black Earth Creek

Photo courtesy WDNR

Watershed (Bender, 2000). These groups, together with the Natural Heritage Land Trust, Trout Unlimited, American Farmland Trust, Wisconsin Wetlands Association, Madison Audubon Society, and the River Alliance of Wisconsin have formed the Black Earth Creek Watershed Land Conservation Coalition to protect the water quality and aquatic ecosystems of the creek and scenic values of the watershed. A part of the groups strategy is to protect the watershed through the purchase of land or development rights from landowners in the watershed (Morton, 2000-2001).

CASTLE ROCK CREEK

Castle Rock Creek, otherwise known as Fennimore Fork, is located in the Blue River Watershed. The Creek begins in Grant County and flows to the Wisconsin River at Blue River. The middle



Castle Rock Creek

Photo courtesy of Mike Smith

portion of the creek is an Exceptional Resource Water, (ERW) while the section of the creek upstream of that is listed on the 303(d) list of impaired waters. Over the last three years, the creek has received attention from watershed landowners, anglers and public agencies as a result of environmental threats to the stream and the perceived water quality decline. In response to these concerns, a Castle Rock Creek Committee was formed to address water quality concerns to better understand the nature of the stream and the potential water quality threats.

In the last few years, the Castle Rock Creek Committee received a Rivers Protection Grant to help empower the local organization and governmental agencies to conduct water quality monitoring on the stream. In addition, a grant from the USEPA has been granted to conduct intensive chemical and flow monitoring on the creek for the purposes of Total Maximum Daily Load (TMDL) development for the stream. The TMDL model development will determine the maximum pollutant loads and the reduction goals needed to improve the stream and remove the 303(d) impaired stream designation.

Partners involved in the Castle Rock Creek include the WDNR, Grant County LCD, USEPA, Castle Rock Creek Watershed Committee and other interested citizens (Marshall, 2000-2002).



Angler on Castle Rock Creek

Photo courtesy of Steve Born

Want to know more about the Castle Rock Creek Watershed?

<http://www.dnr.state.wi.us/org/gmu/lowerwis/castle.htm>

CITIZEN STREAM AND LAKE MONITORING

Citizens in the basin have been and continue to be active participants in the management of the water resources in the Lower Wisconsin River Basin. Through several different programs, citizens in the basin have monitored waterbodies near their homes (Map 5).

For approximately the past five years, the Valley Stewardship Network has organized citizen stream monitoring efforts in the Kickapoo River Valley. This group monitors the water chemistry and the flow of the streams. In addition, the group has placed temperature loggers in the streams to establish a record of the water temperature in the streams. The citizen monitors evaluate the habitat in the streams (Koperski, 2002). In other portions of the basin, UW-Extension in partnership with the Harry and Laura Nohr Chapter of Trout Unlimited (TU) have held training sessions to teach interested citizens how to monitor streams for temperature, turbidity, and dissolved oxygen and how to conduct biotic index, and habitat assessments. As a result of these programs, there are numerous citizen stream monitoring projects in the Lower Wisconsin River Basin, (Table 1) (Compton, 2001).

In late fall of each year, these stream monitors get together with others interested in learning more about water quality and citizen monitoring for the annual Water Celebration sponsored by the Nohr Chapter of TU, UW-Extension and the Valley Stewardship Network.

Table 1: Citizen Stream Monitoring Locations in the Lower Wisconsin River Basin

<i>Citizen Stream Monitoring Location</i>	<i>Watershed</i>
Halls Branch	Lower Kickapoo River (LW02)
Caswell Hollow Creek	Reads and Tainter Creeks (LW03)
Nederlo Creek	Reads and Tainter Creeks (LW03)
West Fork Kickapoo River	West Fork Kickapoo River (LW04)
Harrison Creek	West Fork Kickapoo River (LW04)
Warner Creek	Middle Kickapoo River (LW05)
Jug Creek	Middle Kickapoo River (LW05)
Brush Creek	Middle Kickapoo River (LW05)
Billings Creek	Middle Kickapoo River (LW05)
Cheyenne Valley Creek	Middle Kickapoo River (LW05)
Elk Creek	Middle Kickapoo River (LW05)
Bear Creek	Middle Kickapoo River (LW05)
Sanders Creek	Green River and Crook Creek (LW07)
Big Green River	Green River and Crook Creek (LW07)
Castle Rock Creek	Blue River (LW09)
Blue River (2 sites)	Blue River (LW09)
Big Spring Creek	Blue River (LW09)
Flint Creek	Otter and Morrey Creeks (LW11)
Harker Creek	Otter and Morrey Creeks (LW11)
Lee Creek	Otter and Morrey Creeks (LW11)
Brush Creek	Willow Creek (LW12)
Baraboo River	Lower Baraboo River (LW21)
Boulder Creek	Lower Baraboo River (LW21)
Leech Creek (2 sites)	Lower Baraboo River (LW21)
Rowley Creek	Lower Baraboo River (LW21)
Hay Creek (3 sites)	Crossman Creek & Little Baraboo River (LW23)

For more information and to see the data collected by some of these stream monitors, see the Trout Unlimited website. To get involved in citizen stream monitoring projects, contact Trout Unlimited or the Valley Stewardship Network.

For more information on the Citizen Stream Monitoring:
http://members.tripod.com/nohrchapter/monitor_home.htm

Another program, the Self-Help Lake Monitoring Program, gives citizens an active role in lake management activities and assists the WDNR with basic data collection. The self-help volunteers are trained by a WDNR lake management specialist to measure water clarity and monitor levels on some lakes. There are several locations in the basin where Self-Help Monitoring Volunteers are currently active (Table 2) (Filbert, 2001).

Table 2: Site of Self-Help Lake Monitoring in the Lower Wisconsin River Basin

<i>Lake</i>	<i>County</i>	<i>Watershed</i>
Blackhawk Lake	Iowa	Otter and Morrey Creeks (LW11)
Indian Lake	Dane	Black Earth Creek (LW17)
Fish Lake	Dane	Roxbury Creek (LW18)
Lake Wisconsin	Sauk	Lake Wisconsin (LW19)
Devils Lake	Sauk	Lower Baraboo River (LW21)

For more information on Self-Help Lake Monitoring:
<http://www.dnr.state.wi.us/org/water/fhp/lakes/procedure.htm>



Citizen stream monitor collecting macroinvertebrates (aquatic insects)
 Photo courtesy of Peggy Compton, UWEX

Map 5: Citizen Monitoring Locations, Exceptional and Outstanding Resource Waters (ERW/ORW), and Impaired Waters (303(d))

DEVIL'S LAKE PROJECT

Devil's Lake, located in Sauk County, is a geologically unique lake located within the globally important Baraboo Hills and Wisconsin's most popular state park. The lake has unnaturally high phosphorus levels. This phosphorus is the result of historic pollution from inadequate septic systems, a leaking park sewer main and previously active farms. Even though these sources are no longer present, high phosphorus levels are continually recycled from the bottom mud in the deep zone of the lake each year and cause a variety of water quality problems including periodic algal blooms, nuisance attached algae growths, anoxia in the hypolimnion which degrades trout habitat, high snail production, which are an intermediate host for Swimmer's Itch parasites, and high levels of mercury in fish.

A project to remove phosphorus rich water from the bottom of the lake through hypolimnetic pumping during the fall of each year will deplete the unwanted pollution. Phosphorus pumping is the only sound environmentally feasible technique for reducing unnaturally high phosphorus levels and the other water quality problems associated with the high fertility. The bottom water will be discharged into Babbling Brook, an intermittent stream upstream from the park's service garage. Clean runoff water will be diverted from the intermittent channel to the lake to replace the volume of water that is pumped out during the fall. The project is supported by the WDNR, the Friends of Devil's Lake State Park, Devil's Lake Citizens Advisory Committee and Sauk County (Marshall, 2000-2002; Morton 2000-2001).



South shore of Devil's Lake

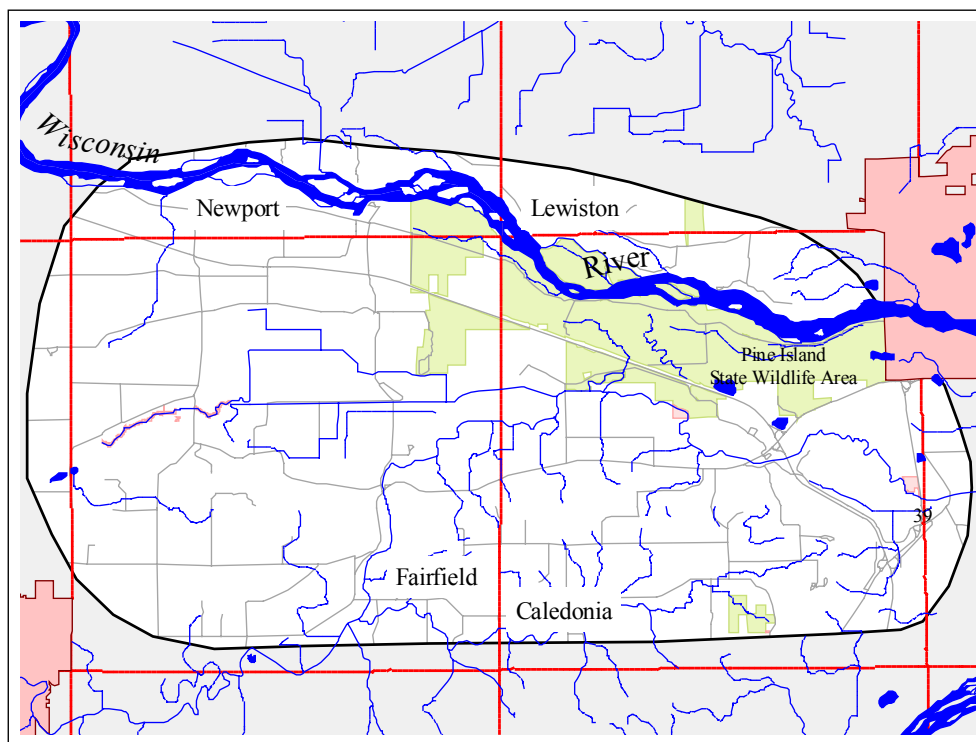
Photo courtesy of Erin Decker, WDNR

THE FAIRFIELD MARSH CONSERVATION PARTNERSHIP

The Fairfield Marsh area is located in Sauk and Columbia Counties, just north east of the City of Baraboo (Map 6). Through habitat restoration projects, the area has the potential to provide habitat for multiple upland grassland bird species as well as wetland dependent bird species, including mallard, blue-winged teal, great blue herons and egrets. As a result of the need and the desire to preserve and protect natural resources in the area without establishing a National Wildlife Refuge, the Fairfield Marsh Conservation Partnership was formed. A committee, called the Farming and Conservation Together Committee, or (FACT), comprised of landowners, conservation organizations, and various leaders of local, state, county and federal governments, formed in 1999 to come up with a way to protect the resources in the 16,000-acre study area that is reliant upon participation in voluntary conservation and restoration projects and programs.

Overall, the Fairfield Marsh Conservation Partnership is intended as a means of preserving and restoring fish and wildlife habitats associated with the historic Fairfield Marsh of northeast Sauk County and northwest Columbia County. The project will eventually restore all or part of a drained wetland basin containing wooded swamps, wet prairies and associated forested uplands. Restored grasslands will provide breeding habitat for a myriad of migratory birds, including waterfowl. The project could also lead to the re-establishment of trout habitat in lower Leech Creek and enhance existing habitat in the upper reaches (USFWS, 2001).

Map 6: The Fairfield Marsh Area



KICKAPOO RIVER VALLEY

The Kickapoo River, or the Crooked River, drains 768 square miles of deeply dissected land that includes portions of Monroe, Vernon, Richland and Crawford Counties. The river flows for 65 miles as the crow flies, but 130 miles as the fish swims to the Wisconsin River. The Kickapoo River is located in what is known as the "Driftless" region of the state and steep hills and sandstone cliffs are a common site in the Kickapoo River Valley. The valley contains numerous native plant and animal species, some of which are quite rare. The beauty of the Kickapoo River Valley and cold, clear streams full of trout attract many visitors to the basin who canoe, hunt or fish. Because of the valley's value and beauty as a resource, there are many initiatives that work to improve and protect the natural resources and promote the economic viability of the region. Many of these initiatives rely on partnerships between various local, state and federal groups and the citizens who live in the valley (Koperski, 2001).

Kickapoo Valley Reserve: Ownership of the 8,569 acre Kickapoo Valley Reserve, located in central Vernon County, recently transferred from the U. S. Army Corps of Engineers to the State of Wisconsin and the Ho-Chunk Nation. The Reserve, originally planned to contain a large flood control structure and impoundment, is home to numerous native species of plants and animals. The Reserve is managed by an 11-member board, which includes a joint management agreement with the Ho-Chunk Nation. It is the first time a locally controlled board has managed state land. The board decided to ban all motorized vehicles except snowmobiles. Recreational activities include on- and off- road biking, primitive camping, canoeing, hiking, cross-country skiing, horse riding, fishing and hunting. Future plans for the reserve include the construction of timber bridges to connect many trails and a visitors center (Koperski, 2001).

Middle Kickapoo River Priority Watershed Project: The Kickapoo River Valley contains many active farms. This, in addition to the steep terrain of the region, has led to some severe nonpoint source pollution and flooding problems. The Middle Kickapoo River Priority Watershed Project has been ongoing since 1989. This project aims to improve land management practices in order to reduce nonpoint source pollution. The Monroe, Richland, and Vernon County Land Conservation Departments have worked with farmers for 10 years to successfully reduce the amount of phosphorus and sediment from reaching nearby streams. The project will continue until 2004 (Koperski, 2001).

Valley Stewardship Network: A coalition of citizens committed to conservation efforts in the Kickapoo River Valley have formed the Valley Stewardship Network (VSN). Their goal is to encourage, promote and create opportunities for proactive stewardship efforts in the Kickapoo River Valley. They plan to accomplish this goal through education and awareness efforts, and by promoting community pride, positive land-use patterns, compatible development and communication and coordination among groups and individuals in the valley. VSN also coordinates water quality monitoring of the Kickapoo River and its tributaries by adults and students (Koperski, 2001).

Student Curriculum: There is a concerted effort by teachers in many schools of the Kickapoo River Valley to bring students into the outdoor classroom. Many teachers have used the Kickapoo River Valley as an outdoor classroom to teach appreciation for the beauty of the valley, social history of the area, outdoor skills, and science based learning such as water quality

monitoring, and wetland and prairie identification. Trout Unlimited (TU) donated mapping software and data layers specific to the Kickapoo River Valley to several schools for classroom use. The Kickapoo Valley Reserve sponsored a teacher in-service for 40 educators from around the valley to learn about ecology, wetlands, land management, water quality, and the oral history of Native American and European settlers in the area (Koperski, 2001).

Restoration of Trout Habitat: Since the 1950's, local sporting groups (i.e. rod and gun clubs, trout unlimited chapters), municipalities, and civic groups in the Kickapoo River Basin have donated their time and money to improve in-stream habitat for trout. These groups have regularly planned in-stream structure construction days as well as donated materials and money. All projects take place on either publicly owned land or land with public fishing easements. The successful habitat restoration of approximately 100 miles of stream in this basin could not have been accomplished without the help of these enthusiastic partners (Koperski, 2001).

Native Brook Trout Restoration: Brook trout are the only trout species native to Wisconsin. These trout once flourished in the Kickapoo River Basin. As a result of changing land use, degradation of in-stream habitat and a loss of food, these trout species disappeared from streams in the basin. In 1995, some WDNR fish hatcheries began to raise wild brook trout for eventual release in Wisconsin streams. These wild strains show better evidence of survival than the domestic trout. The young wild brook trout are then stocked in streams with appropriate water temperatures, habitat, food availability and lack of brown trout. A year or two after a stream is stocked with wild brook trout, an assessment is done to determine the health and size of the population. Many streams in the Kickapoo River Basin now contain self-sustaining wild brook trout populations, some of which were aided by the stocking of hatchery raised wild brook trout (Koperski, 2001).

Home Rivers Initiative: Trout Unlimited identified the Kickapoo River Valley as a Home Rivers Initiative project. This project recognized that successful stream restoration and protection require a watershed perspective that involves a significant amount of time, science, and money. The Kickapoo River Valley Home Rivers Initiative invested in building partnerships, biophysical research, socio-economic studies, habitat restoration and public outreach. As a part of this initiative, Trout Unlimited and the Kickapoo Watershed Conservation Project Coordinating Committee developed the Kickapoo River Conservation Plan as a guide for residents and interested groups regarding future actions in the Kickapoo River Valley to protect valuable stream resources. (Trout Unlimited, 1999).



Kickapoo River
Photo courtesy WDNR

LITTLE LEMONWEIR EASEMENT ACQUISITION PROJECT

Since 1990 the WDNR has been acquiring perpetual easements along the Little Lemonweir River in Juneau and Monroe Counties. This property is still under the ownership of the private landowner. The purpose of the program is to improve and preserve water quality, fish habitat and wildlife habitat. The easements are open to public fishing only and hunting and trapping activities are not allowed.

The easements are essentially buffer strips along the streambanks that have a minimum width of 66 feet. The easement program prohibits the pasturing of livestock and the planting or harvesting of crops within the easement area. The WDNR is responsible for constructing the fences where necessary to prevent livestock from entering the easement area.

To date, the WDNR has purchased a total of 26 easements along the Little Lemonweir River. These easements cover approximately 75% of the cold water portion of the river in Juneau and Monroe Counties. This project has been successful as a result of cooperation between the WDNR and private landowners (Ironside, 2001).



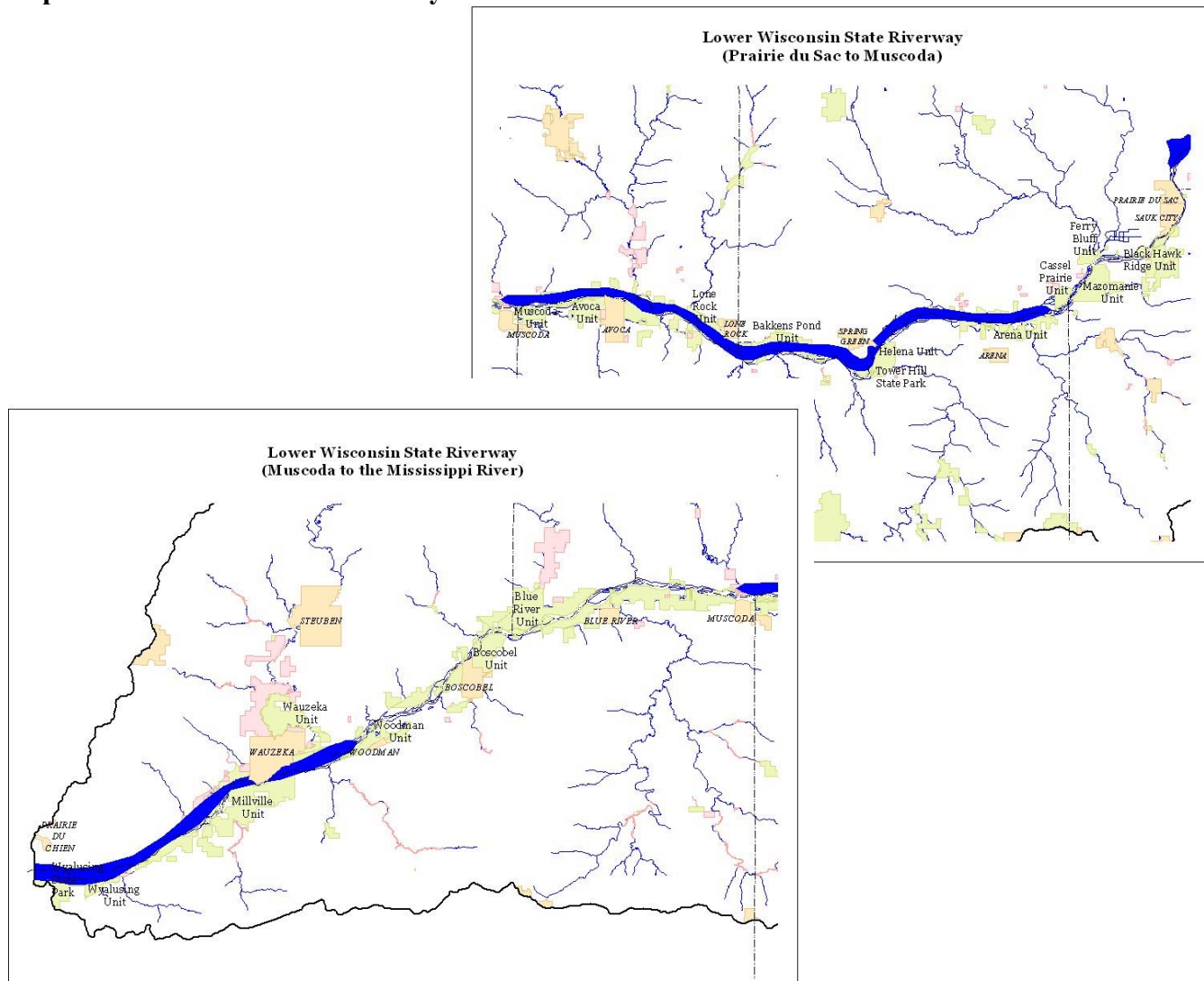
Streambank Easements on the Little Lemonweir River

Photo courtesy of Scot Ironside, WDNR

LOWER WISCONSIN RIVERWAY PROJECT

The Lower Wisconsin River has long been recognized as an important due to its aesthetics, aquatic resources, wildlife habitat and potential for recreational opportunity. In recognition of this great resource, the Wisconsin Legislature created the Lower Wisconsin State Riverway in 1989, which includes a 92.3-mile free-flowing stretch of the river from the Prairie du Sac dam down to the river's confluence with the Mississippi River. The riverway project covers 79,275 acres, of which the state already owns 43,740 acres with easements on another 2,800 acres (Delwiche, 2001) (Map 7). To help preserve, protect and manage the resources the Riverway, the Legislature created the Lower Wisconsin State Riverway Board. The main function of the board is to preserve the aesthetic quality of the river valley without prohibiting development. The Board has several water resource related goals including protecting and maintain the natural beauty of the river valley, maintaining and enhancing recreational opportunities, and maintaining and enhancing wildlife habitat and populations. For more information on the Lower Wisconsin Riverway Project, see the Lower Wisconsin River Main Stem Narrative, page 90.

Map 7: Lower Wisconsin Riverway



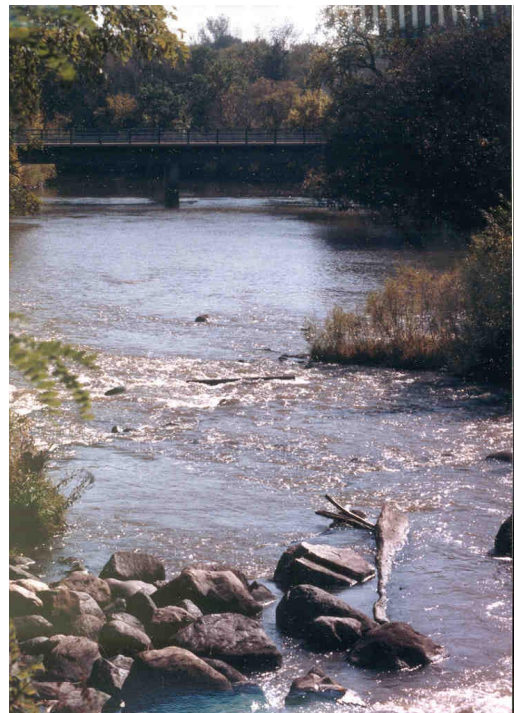
RECONNAISSANCE STUDY

The US Army Corps of Engineers, St. Paul District, in cooperation with the Wisconsin Department of Natural Resources and the Sand County Foundation, conducted a Reconnaissance Study of the Baraboo and Wisconsin River Basins during the fall and winter of 2001 and 2002. The reconnaissance study was funded through the FY 2001 Energy and Water Development Appropriations Act (Public Law 106-377).

The purpose of the study is to help Federal interests determine their involvement in the development and implementation of water resource solutions to problems in the Baraboo and Wisconsin River Basins. An interest in these problems may include finding solutions to flooding and/or ecosystem degradation along the river. The information collected during the reconnaissance study may also lead to other potential projects. The projects that were identified through the reconnaissance study are intended to support the needs of the Wisconsin River while complementing state, local and privately funded initiatives currently on-going in the basin. These projects include;

- ◆ Aquatic ecosystem restoration at Prairie du Sac through the development of fish passage around the Prairie du Sac dam.
- ◆ Streambank and aquatic habitat restoration in Columbia, Crawford, Grant, Richland, Sauk, Iowa and Dane Counties through the restoration of riparian corridors.
- ◆ Development of a plan for ecosystem restoration and flood damage reduction of the Caledonia and the Agricultural Levee Area near the confluence of the Baraboo River with the Wisconsin River, just west of the City of Portage.

Currently, the reconnaissance study conducted by the Corps of Engineers is in draft stages. Once the study is finalized and if there is Federal interest in one or more of the above projects, the Corps will begin to develop a Project Management Plan (PMP) and will begin to negotiate one or more Feasibility Cost-Sharing Agreements (FCSAs) with non federal partners to begin the next phase of the project (United States Army Corps of Engineers, 2002).



Baraboo Rapids

Photo courtesy of WDNR

SNOW BOTTOM NATURAL AREA

Natural processes continue to occur much as they have for thousands of years in northeastern Grant County's Snow Bottom State Natural Area (SNA). Despite this, the region is currently being threatened by the absence of the fires that shaped this area prior to European settlement, some intensive agricultural practices and changes in land use patterns. Partly in response to these changes, the 495 acre Snow Bottom State Natural Area (SNA) was established in 1992. Of these 495 acres, 120 are owned by the state and another 80 acres are in easement.

Originally, Snow Bottom SNA was established to protect some of the pine relicts and other features that make this area biologically rich and aesthetically attractive. Pine relicts are pine forests in southern Wisconsin that have persisted since the last glacier receded some 10,500 years ago. Outside of the pine forests of Northern Wisconsin, remnant pine forests are usually restricted to the north-facing steep slopes and rocky cliffs of the Driftless area where local climatic conditions are cool and moist. Taken individually, most relicts are small (less than 5 acres), but together these parcels make a significant area that possesses many groundlayer species of plants including many that typically occur only in the northern part of the state.

Recently the Natural Resources Board approved a request to expand the project's boundaries and broaden the WDNR's role in the protection of Snow Bottom. Included in the boundary are parts of Wingville, Muscoda, Hickory Grove and Castle Rock townships, of which the state currently owns 400 acres, 80 acres of easements and numerous fishing easements. The expanded boundary protects a diverse and spectacular landscape encompassing the most significant remaining pine relicts in Wisconsin, as well as many other important and uncommon native plant communities, riparian areas and geological features. Some of these include sandstone cliffs, with shaded and open biotic communities; fens and sedge meadows (uncommon in the Driftless region); dry to wet prairie; as well as significant aquatic resources.

The Blue River and Castle Rock Creek also flow through the Snow Bottom area. The Blue River is considered an Exceptional Resource Water (ERW) and Castle Rock Creek is considered an Outstanding Resource Water (ORW). In addition, these streams support wild populations of brown trout and the WDNR is establishing native populations of brook trout in the headwater area. Combine these elements with cliffs dominated by stands of white pine and other associated plant species and it is easy to see why the area is popular as a trout fishery. The project focuses on the removal of invasive plants, prescribed burning, and stream and riparian area restoration projects.

Active partners include individual private landowners and several local land trusts and other groups such as the Prairie Enthusiasts, Trout Unlimited, the National Wild Turkey Federation, the Nature Conservancy, and the WDNR. Future potential partners include local conservation clubs, local municipalities, educational institutions, corporations, and industry. Other partners could include Farmland Conservancy, Farm Bureau, UW-Extension, Grant County, the NRCS, FSA and the Mississippi River RC&D. Support could be garnered through the CRP, CREP, WHIP and EQIP programs (Zine, 2001).



Example of a pine relict.

Photo courtesy of E.J. Epstein and WDNR.

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CHAPTER 2: PRIORITIES FOR NATURAL RESOURCE MANAGEMENT IN THE BASIN

With a diverse array of resources and people in the Lower Wisconsin River Basin, there are many different resource management needs and many different resource management goals.

Overall, the WDNR operates under a broad mission statement for managing the natural resources of the State. This mission is reflected in the WDNR's "Mission Statement."

The WDNR's Strategic Plan divides the "Mission Statement" into four main priorities including:

Making People Our Strength

Promotes people, organizations and officials working in partnership to provide the state with healthy, sustainable ecosystems. Partners look for innovative ways to set priorities, accomplish tasks and evaluate successes to keep Wisconsin in the forefront of environmental quality and science-based management.

Sustaining Ecosystems

Recognizes the state's diverse ecosystems and protects, manages and uses them through sound decisions that reflect long-term considerations for a healthy environment and a sustainable economy.

Protecting Public Health and Safety

Our lands, surface waters, groundwater and air must be kept safe for humans and other living things that depend upon them.

Providing Outdoor Recreation

Our citizens and visitors should be able to enjoy outdoor recreation and have access to a full range of nature-based outdoor recreational opportunities.

The recommendations that follow represent broad, basin-wide recommendations that work to meet the goals set forward by the WDNR's Mission Statement. Many of these recommendations also reflect the priorities of the citizens who live in the basin, other agencies in the basin and nonprofit organizations. These recommendations are in no specific order. *(For more resource specific recommendations, please see the watershed narratives in Chapter 6.)*



Mission Statement:

*To protect and enhance our natural resources:
our air, land and water;
our wildlife, fish and forests
and the ecosystems that sustain all life.*

*To provide a healthy, sustainable environment
and a full range of outdoor opportunities.*

*To ensure the right of all people
to use and enjoy these resources
in their work and leisure.*

*To work with people
to understand each other's views
and to carry out the public will.*

*And in this partnership
consider the future
and generations to follow.*

PRIORITY ONE: INCREASING COMMUNITY INVOLVEMENT

By increasing community involvement in natural resource management, we form valuable partnerships that enable us to better address issues that relate to the sustainability of our resources. *(Making People Our Strength and Sustaining Ecosystems)*

Issue: Community involvement is a vital part of natural resource management. It is important to get the community involved in projects happening in their watershed.

- ◆ Continue to support interagency and community supported natural resource projects.
- ◆ Promote community-oriented natural resource programs such as the existing citizen monitoring programs listed in Tables 1 and 2 on pages 10 and 11.
- ◆ Develop a basin-wide network of citizen stream and lake monitors using current monitors as a starting point.
- ◆ Assist community-based groups, such as Friends groups, citizen monitoring groups, and lake management or protection organizations, with identifying and receiving sources of funding to support their efforts.

PRIORITY TWO: PROVIDING OUTDOOR RECREATION

Working to provide our citizens and visitors with increased access to recreational opportunities to give them a richer outdoor experience, while protecting and restoring valuable ecosystems. *(Sustaining Ecosystems and Providing Outdoor Recreation)*

Issue: The basin's resources are utilized by the thousands of individuals who live in or near the basin. It is important to provide abundant and diverse recreational opportunities for these individuals from boating, fishing, hunting, hiking and biking, to camping, birdwatching and swimming.

- ◆ Increase cooperation between partners to expand and improve upon recreational opportunities in the basin.
- ◆ Develop new economically viable canoe trails in the basin and maintain and improve the existing ones on the Kickapoo River, Baraboo River and the Wisconsin River.
- ◆ Increase public access to good quality streams, rivers and land to increase recreational opportunities throughout the basin.
- ◆ Evaluate specified streams to determine their potential as trout streams or other game fish fisheries (smallmouth bass, northern pike, walleye, etc.). See watershed narratives for recommended streams.
- ◆ Wild trout strains should continue to be stocked in trout streams to establish a healthy, wild population of trout in select streams in the basin.
- ◆ Develop a fisheries management plan for those waters with the potential as an improved fishery resource. See watershed narratives for recommended streams.
- ◆ Promote hunting and fishing opportunities in the basin to ensure the long-term viability of these recreational opportunities.
- ◆ Develop and maintain swimming beaches throughout the basin.
- ◆ Update the classification of several trout streams in the state Administrative Code NR 102. See watershed narratives for recommended updates.
- ◆ Identify areas where implementing a no-kill fishery, or other special regulations, may help to improve the fishery.

- ◆ Work with partners and local units of government to support the land acquisition and goals and priorities identified in the Land Legacy Study. See page 63 for information.
- ◆ Evaluate the impact of water levels on the Wisconsin River on recreational opportunities and wildlife habitat.

PRIORITY THREE: ASSESSING AND IMPROVING WATER QUALITY AND IN-STREAM HABITAT

Protection of and improvement of water quality and in-stream habitat is vital to sustaining aquatic ecosystems. Often, a partnership between local and state organizations can help to better restore or protect water resources. Better water quality not only improves the health of natural ecosystems, but it also often has implications for human health. *(Making People Our Strength, Sustaining Ecosystems, and Protecting Public Health and Safety)*

Issue: Many of the basin's vast water resources have not been monitored. In addition, those that have been monitored in the past have not been recently re-evaluated. Baseline data is needed to evaluate stream health and trends in water quality, fisheries and in-stream habitat in the basin.

- ◆ Increase cooperation between partners in the basin (including citizen monitors and agency personnel) to improve coordination of monitoring efforts.
- ◆ Implement baseline monitoring for selected wadable and nonwadable streams in the basin by 2006. See watershed narratives for recommended streams.
- ◆ Include fisheries data, and in-stream habitat assessment and water quality information with all baseline monitoring.
- ◆ Enter results from baseline data collection into a centralized database system for easier access and summarization.
- ◆ Conduct stream condition assessments in the basin on select streams. See watershed narratives for recommended streams.
- ◆ Support the citizen-monitoring efforts in the basin that are listed on Tables 1 and 2 on pages 10 and 11. Promote efforts to increase citizen monitoring efforts.
- ◆ Enter data collected by citizen stream monitors into the central state database being established and managed by the Water Action Volunteer Coordinator and the University of Wisconsin-Extension.
- ◆ Evaluate the need and feasibility of hiring one person to coordinate the citizen stream monitoring efforts in the basin.
- ◆ Test fish in select waters to determine the presence and bioaccumulation of toxics in the water.
- ◆ Monitor and assess declining trends in fish populations to determine potential causes and solutions to the problem.
- ◆ Develop an assessment strategy in the basin to evaluate named streams and watersheds that currently do not have a known nonpoint source priority rank and establish a rank.
- ◆ Monitor and measure pollutant loads to impoundments such as Blackhawk Lake, Twin Valley Lake, White Mound Lake and Shannahan Lake, for long term lake management.

Issue: Many of the classifications of streams listed in Administrative Codes NR 102 and NR 104 are outdated.

- ◆ Some streams in the basin that previously received a discharge are no longer receiving that discharge. It is important to re-evaluate these streams to determine the current health and status of the fishery. A change in status should be noted in Administrative Codes NR 102 and 104.
- ◆ Some recent stream monitoring has shown that the quality or the fishery of the resource is different than previously listed in NR 102. These changes have been noted in the latest update of the Wisconsin Trout Streams publication (PUB-FH-806 2002). Administrative codes NR 102 and NR 104 need to be subsequently upgraded to reflect these changes.
- ◆ Streams upgraded to a Class I trout stream should also be designated as ERWs in Administrative Code NR 102.

Issue: Many of the water resources in the basin are degraded. As a result, there is poor water quality and a lack of good quality in-stream habitat in the basin. Of these resources, many of them have the potential for improvement through a habitat improvement project or some other means.

- ◆ Improve coordination of partner groups in the basin to increase the success of in-stream habitat improvement projects.
- ◆ Conduct in-stream habitat work on selected priority streams in the basin. See watershed narrative for recommended streams.
- ◆ Protect spring heads and headwater tributaries that provide water to the good quality cold water streams in the basin.
- ◆ Conduct an assessment of select streams in the basin to determine where habitat improvement projects will have the most effect. See watershed narratives for recommended streams.
- ◆ Continue to monitor and evaluate bottom withdrawal as a method to improve water quality in man-made impoundments and a way to decrease the impact of these structures on the downstream portion of the stream.
- ◆ Assess creeks or streams in which improvements have been made to determine the success of the project.
- ◆ Increase public access to streams to aid in habitat improvement work along the stream.
- ◆ Re-meander streams or redirect them to their original channels where feasible.
- ◆ Evaluate the streams listed in Appendix D to determine if they should be removed from the EPA's list of "impaired waters."
- ◆ Continue to assess the impacts of removal of the dams on the Baraboo River. Long term monitoring should be done to determine the effect of the dam removal on water quality, aquatic insects and the fish community.
- ◆ Address fish migration problems throughout the basin. Specifically, impassable bridges and dams that cause migration problems should be evaluated to identify possible solutions to the problem.
- ◆ Upgrade designated streams and stream segments to Exceptional or Outstanding Resource Water status to offer greater protection for good quality water and in-stream habitat. See stream tables in watershed narratives for streams recommended for an upgrade.
- ◆ Conduct sediment monitoring on select lakes in the basin.

- ◆ Develop native grassland buffers, grassed waterways and other woodland and wetland buffers to retain nutrients and sediment and prevent them from entering surface water in the basin.
- ◆ Promote watershed protection programs such as CREP (Cropland Reserve Enhancement Program) so that these programs are developed in the most efficient and effective way possible.
- ◆ Work with partners in an effort to reduce the impacts of PL 566 dams such as flood control structures, ponds and other impoundments such as those in Otter and Morrey Creek (LW11), Mill and Blue Mounds Creek (LW15), and Honey Creek (LW16) watersheds.

PRIORITY FOUR: REDUCE SOURCES OF AGRICULTURAL AND URBAN RUNOFF

Reducing runoff often requires the partnering of local, state and federal organizations with private citizens. The development and implementation of projects to address this problem often leads to an improvement in ecosystem health. (*Making People Our Strength and Sustaining Ecosystems*)

Issue: Runoff is the biggest threat to water quality in the basin. This problem also has implications with respect to soil productivity and groundwater quality. Since much of the basin is rural, many of these sources come from rural land use activities.

- ◆ Increase partnership involvement in reducing sources of rural runoff.
- ◆ Apply for Targeted Runoff Management, (TRM), or other grants, for those streams listed as a high priority for nonpoint source pollution reduction on Table 7, page 50.
- ◆ Identify priority areas in need of streambank protection. See watershed narratives for recommended streams.
- ◆ Install best management practices on the upland areas and bluffs in the basin to decrease the volume of cropland erosion that reaches the surface waters in the basin.
- ◆ Seek federal and state sources of funding to provide cost share dollars to local landowners to install best management practices on their land and reduce nonpoint source pollution. Examples of these sources of funding include the EQIP program, the urban nonpoint program and the TRM program.
- ◆ Establish nutrient management on more land throughout the basin.
- ◆ Improve the management of streambank grazing in the basin to cut back on the amount of erosion from this activity that reaches to the surface water.

Issue: In areas experiencing increasing development, urban runoff also contributes to surface and groundwater pollution.

- ◆ Increase partnership involvement in reducing sources of urban runoff.
- ◆ Those communities that currently do not have a stormwater management plan or ordinance should develop and implement one.
- ◆ Implement stormwater management recommendations from existing stormwater management plans.
- ◆ Municipalities in the basin should improve existing or develop new construction site erosion control ordinances.
- ◆ Municipalities should evaluate the sites used for land application of wastewater biosolids to ensure that the sites are properly designed and located.

- ◆ Alternative stormwater management practices should be evaluated for their use in new development. Effective practices, such as grassed stormwater swales, directing roof runoff to grassed areas, or building rain gardens, should be promoted to reduce the impact of stormwater on surface water bodies.

PRIORITY FIVE: IMPROVE GROUNDWATER SUPPLY AND HEALTH

Groundwater contamination is a serious issue when it comes to public health and safety. This problem, when it arises, is often addressed by many people, including private citizens and local and state governments. *(Making People Our Strength and Protecting Public Health and Safety)*

Issue: All of the citizens in the basin get their drinking water from groundwater sources. These sources are threatened by nonpoint source pollution and land use activities.

- ◆ Protect and restore groundwater recharge areas in the basin to ensure sufficient groundwater infiltration into groundwater aquifers.
- ◆ Communities without wellhead protection plans should evaluate their wells and consider developing one. Table 6 on page 45 lists communities with current plans.
- ◆ Evaluate the use of deicers for potential groundwater quality impacts.
- ◆ Increase awareness of the location of atrazine prohibition zones, listed in Appendix B.
- ◆ Promote the proper abandonment of unused wells by providing well abandonment demonstrations and financial support to properly abandon wells. Special efforts should be made in the following watersheds; LW16, LW19, LW20, and LW22.
- ◆ Promote nutrient and pesticide management in the basin in an effort to reduce the amount of groundwater contamination from these two sources. Special attention should be focused on the following watersheds; LW14 through LW22, LW25, LW26, LW27 and LW29.
- ◆ Promote well driller education.

PRIORITY SIX: PROTECT WILDLIFE AND PLANT SPECIES AND INCREASE WILDLIFE HABITAT

The biggest threats to wildlife include development and fragmentation of habitat. Since most habitat in the state is privately owned, it is increasingly important to develop partnerships between citizens and other organizations to address these issues. By working together to preserve habitat, the overall increase in wildlife habitat may translate to increased recreational opportunities from hunting and fishing to birdwatching and hiking. *(Making People Our Strength, Sustaining Ecosystems, and Providing Outdoor Recreation)*

Issue: There are a variety of threatened, endangered and rare species in the basin. Without protection, these plants and animals may disappear.

- ◆ Increase cooperation between partners in the basin to protect threatened, endangered and rare species.
- ◆ Survey all streams where endangered, threatened or state species of concern have been noted to determine if they are still present in the stream and determine the extent of their distribution throughout the basin. See stream tables in the watershed narratives for waterbodies with rare aquatic species.

- ◆ Survey locations where unique natural vegetative communities and plant species have been noted to determine if they are still present and establish their extent in the basin. See watershed narratives for recommended streams.

Issue: As a result of increasing development in the basin, wildlife habitat is being lost and plant communities are being altered. This has an impact on plant communities and on the availability of suitable habitat for wildlife.

- ◆ Improve coordination between partner groups to prevent the fragmentation and restoration of wildlife habitat.
- ◆ Increase the amount of habitat available for habitat, particularly, increase grassland habitat for grassland birds. See Table 13, page 63.
- ◆ Use CREP and CRP to help increase the amount of grassland habitat in the basin.
- ◆ Protect contiguous blocks of forested land to protect populations of interior dwelling breeding birds.
- ◆ Protect and restore prairie potholes located in the basin to increase biodiversity and waterfowl habitat.
- ◆ Restore oak savanna and prairie in the basin. See Table 12, page 63.
- ◆ Offer incentives for building new developments with a closed and contiguous canopy to support birds and other wildlife.
- ◆ Protect and restore unique vegetative communities such as oak pine barrens.

PRIORITY SEVEN: PRESERVING RURAL LAND USE AND ADDRESSING CHANGING PATTERNS OF LAND USE

Trends in development are relying increasingly on the cooperation between all involved parties. Their decisions have implications on the conservation and restoration of certain types of land use, including the preservation of natural areas. (*Making People Our Strength and Sustaining Ecosystems*)

Issue: Development in rural areas in the basin is increasing. There is a need to preserve land for rural land use while accommodating some development.

- ◆ Municipalities and townships should evaluate their zoning ordinances to determine how development should be addressed.
- ◆ Municipalities that do not have a zoning ordinance should consider developing one.
- ◆ Provide assistance to municipalities and townships during the Smart Growth planning process.
- ◆ Work to prevent the parcelization of larger tracts of land.
- ◆ Work to prevent the development of smaller parcels into permanent residences.
- ◆ Continue to support rural land uses to preserve and sustain the rural character of land in the Lower Wisconsin River Basin.

PRIORITY EIGHT: INCREASING AWARENESS AND PROVIDING OUTREACH AND EDUCATION

Increasing awareness of natural resource issues will lead to increasing partnerships, increased interest in sustaining ecosystems, increased interest in protecting the public's health and safety from adverse environmental problems and an increase in providing recreational opportunities. *(Making People Our Strength, Sustaining Ecosystems, Protection Public Health and Safety and Providing Outdoor Recreation)*

Issue: Awareness of natural resources is important in developing solutions to natural resource challenges. Outreach and education activities are needed to promote awareness and understanding.

- ◆ Develop educational and information materials for high visibility and popular areas in the basin such as Snow Bottom State Natural Area and the Baraboo Hills.
 - ◆ Continue to promote and support citizen based partnership groups, particularly those listed in the watershed narratives.
 - ◆ Develop educational materials to explain the impact of development in non-urban areas.
 - ◆ Increase education about the proper application and storage of pesticides and fertilizers particularly in those watersheds at a high risk for groundwater contamination from these sources.
 - ◆ Develop a monitoring equipment library where schools and other organizations can borrow equipment to teach hands on monitoring and information.
 - ◆ Conduct more grazing workshops to identify the problems caused by overgrazing.
 - ◆ Promote managed rotational grazing.
 - ◆ Conduct drinking water and groundwater quality education program to address the issue of nonpoint source pollution, drinking water standards, and threats to groundwater.
 - ◆ Promote educational activities to ensure the future of hunting and fishing.
-

PRIORITY NINE: CONTROL AND ERADICATE NON-NATIVE AND INVASIVE SPECIES

Controlling non-native and invasive species is important to sustaining healthy, natural communities. In addition, these species can occasionally threaten the safety and health of the public. *(Sustaining Ecosystems and Protecting Public Health and Safety)*

Issue: Non-native and invasive species threaten to displace native plant and animal communities and alter the natural system. These species need to be controlled or eliminated.

- ◆ Increase cooperation between partners to control and eradicate non-native and invasive species.
- ◆ Survey lakes with aquatic non-native and invasive species problems to determine the growth and overall threat. See lake tables in the watershed narratives for lakes where non-native or invasive species are present.
- ◆ Conduct projects to remove invasive and non-native plants from stream corridors and other areas, particularly those listed in Table 10 on page 59.
- ◆ Conduct an investigation to determine a way, other than through the use of chemicals or machines, to reduce undesirable aquatic plant beds, such as Eurasian watermilfoil in lakes throughout the basin.
- ◆ Continue program of prescribed burning to promote the health of natural prairie species and keep the invasive and undesirable species from establishing themselves.

- ◆ Use biocontrol methods where available to control nuisance species such as Purple loosestrife.
-

PRIORITY TEN: INVENTORY AND MAP FEATURES IN THE BASIN

These initiatives can help partnership groups and those acting individually to identify the areas in most need of protection and restoration. In addition, inventories and mapping may show the need for more recreation in an area that might presently be lacking a variety of diverse opportunities. Maps may also show areas that are an immediate or potential threat to public health and safety. *(Making People Our Strength, Sustaining Ecosystems, Protecting Public Health and Safety, and Providing Outdoor Recreation)*

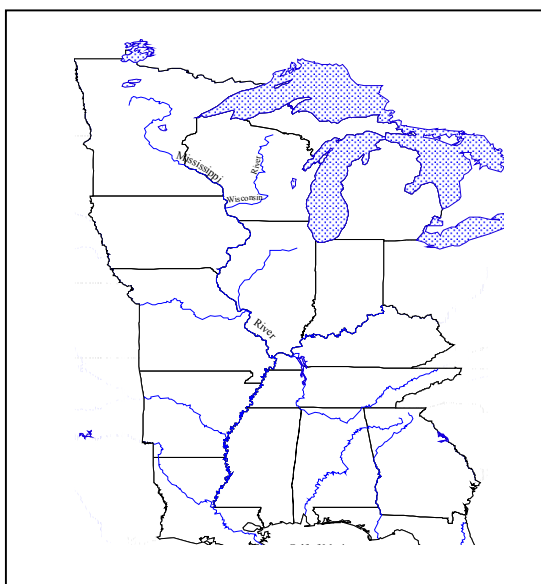
Issue: There are a variety of unique and ecologically important features in the basin that should be inventoried and mapped to help protect and enhance the natural resources features.

- ◆ Inventory remnant prairies in the basin.
- ◆ Inventory and classify the most important wetland complexes in the basin and work for protection of these resources.
- ◆ Develop a comprehensive map of all publicly owned lands in the basin including county, state and federal, and all lands owned by private conservation agencies, such as the Nature Conservancy.

CHAPTER 3: LOWER WISCONSIN RIVER BASIN AT A GLANCE

The Lower Wisconsin River Basin is located in south central and southwestern Wisconsin and drains approximately 5,050 square miles of Wisconsin. The basin spans all or part of the following 12 counties: Adams, Columbia, Crawford, Dane, Grant, Iowa, Jackson, Juneau, Monroe, Richland, Sauk, and Vernon. The major surface water feature in the basin is the Wisconsin River from the Castle Rock Flowage dam to the river's confluence with the Mississippi River near Prairie du Chien. All of the streams that are tributary to the Wisconsin River along this reach are also a part of the basin. Although the Lower Wisconsin River basin covers a large area all by itself, it is actually a part of an even larger river basin; the Mississippi River Basin (Map 8). All of the water that drains into the Lower Wisconsin River flows into the Mississippi River. The Mississippi River then transports the water from the Lower Wisconsin River to the Gulf of Mexico. As a result, our use of our natural resources in Wisconsin has significance on a national and international scale.

Map 8: Mississippi River Basin



GEOLOGY, SOILS AND TOPOGRAPHY OF THE BASIN

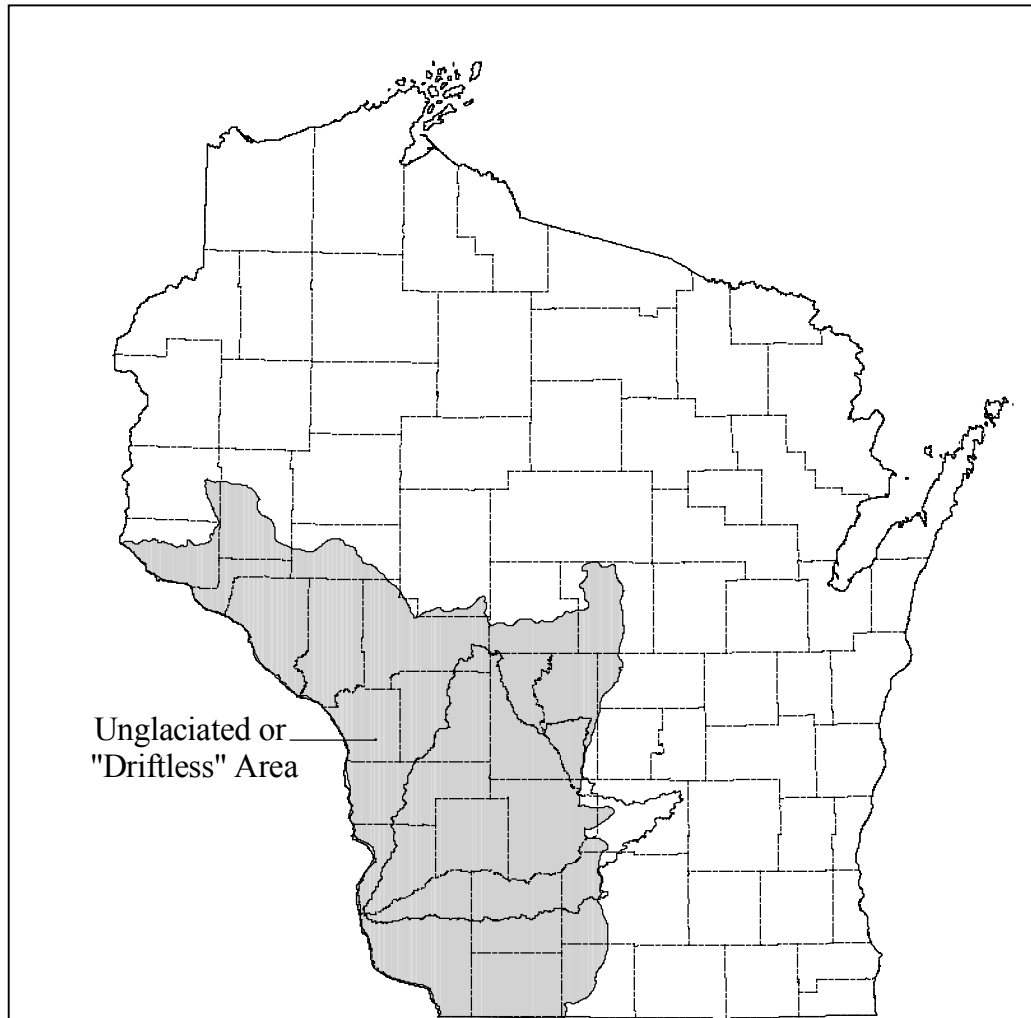
Most of the western portion of the basin lies in the “Driftless” region of the state, or the area not covered by the last glacier while the portion of the basin lying east of the Wisconsin River in Columbia County was covered with glacial drift (Map 9). The northern one-fifth of the basin lies within the boundaries of glacial Lake Wisconsin. Topography, geology, soils and stream characteristics are variable from one landform region to the other, however, the underlying geology of the entire basin is comprised of dolomites and sandstone. South of the Lower Wisconsin River, the bedrock is primarily formed from the Galena Dolomite, St. Peter Sandstone, and Prairie du Chien dolomite group. North of the Lower Wisconsin River, the bedrock consists primarily of undifferentiated sandstones and the Prairie du Chien group of dolomites (Hindall and Borman, 1974).

Glacial Lake Wisconsin, located in northeastern Monroe and southeastern Jackson and Juneau counties, is forested and characterized by either flat or gently rolling terrain. Soil associations in the area are generally somewhat poorly drained to very poorly drained wet mineral or organic soils. There are large wetland complexes in this region, ranging from wet meadow and open marsh to wooded lowlands. Streams in this region are generally slow moving with low gradients, many streams have been channelized or ditched to facilitate drainage, particularly the drainage of wetlands.

Streams in the “Driftless” region are cut into rugged steep-walled valleys and have a higher gradient than those of the glacial Lake Wisconsin area. The streams flowing to the Wisconsin River from the south are shorter with steeper gradients than the streams flowing to the river from the north. The soils in this region are generally moderately to excessively well-drained mineral

soils. Wetlands are usually restricted to margins along streams and rivers. While there are sizable wetland complexes along the Wisconsin River, the percentage of wetlands versus non-wetland areas is significantly less than in other areas of the state. The eastern, glaciated area of the basin is characterized by rolling hills with level valley floors. Soils in this region are well drained to moderately drained soils although soils around Portage and Wyocena are more poorly drained organic soils.

Map 9: Extent of Last Glaciation



PLANT COMMUNITIES IN THE BASIN

Oak savanna was the most widespread and abundant plant association in the Lower Wisconsin River basin at the time of the original land surveys (Map 10). The term oak savanna refers to a plant association in which the oaks, primarily bur, white, and black, are the dominant members of the association. It differs from oak woods in that the trees are rather widely and evenly spaced so that sufficient sunlight reaches the ground to sustain an undergrowth composed primarily of prairie grasses and forbs.

Jonathan Carver (1781) reported that “only a few groves of hickory and stunted oaks covered some...[of the prairies].” Keating, in 1824, spoke of “thin woods, which gradually disappeared,’ and were replaced by prairies. Owen (1848), in the Driftless Area wrote, “we have clumps of trees, disposed with an effect that might baffle the landscape gardener, now crowning the grassy height, now dotting the green slope with partial and isolated shade.” (Excerpted from Curtis, 1959).

Another plant community frequently mapped in this basin was prairie. The surveyors’ records make no mention of specific plants found on these upland prairies except to say that they contained “prairie grasses” or sometimes “grasses and weeds.” However, the treeless condition of these prairie areas is attested to by the fact that, instead of marking witness trees to indicate section and quarter-section corners, the surveyors were forced to build mounds of earth and sod to locate these points (Crossley, 2001).



Wet-mesic prairie. Avoca Prairie-Savanna State Natural Area, Iowa Co.
Photo courtesy of E.J. Epstein and WDNR.

There was also a significant extent of what was classified as southern mesic forest and southern oak forest in eastern Crawford County, most of Richland County and northwestern Sauk county at the time of settlement. These pockets of southern deciduous forest contained sugar maple, basswood, elm, red, white, and black oak.

The timber is burr, white and black oak and yellow oak except south of the Baraboo and that is heavy timbered with Lynn, sugar, elm, ash, oak, ironwood, hickory, etc. The prairies are fine quality and good and ought to be settled and will for I have got six families to go in the spring. Marshes good for hay. – Original land surveyor notes describing Delton township in Sauk County (Crossley, 2001).

Today, the state of Wisconsin has been divided up into regional ecological landscapes (Map 11). The Lower Wisconsin River Basin falls within the boundaries of four of these ecological landscapes: the Western Coulees and Ridge Landscape, the Central Sand Plains Landscape, the Central Sand Hills Landscape and the Southeast Glacial Plains Landscape. Just to the south of the basin on the other side of the Military Ridge lies the Southwest Savanna Landscape.

Map 10: Original Land Cover in the Basin

Map 11: Ecological Landscapes in the Basin

SURFACE WATER AND GROUNDWATER IN THE BASIN

Surface water quality in the basin is generally considered good and the basin boasts a large number of healthy and productive cold and warm sport fisheries. Major rivers in the basin, in addition to the Wisconsin River, include the Lemonweir, Baraboo, Pine, and Kickapoo Rivers. The primary water quality problems are caused by nonpoint sources of pollution, particularly from agricultural operations, excessive populations of rough fish and hydrologic modifications of the streams such as damming, straightening, and the ditching, draining or other alteration of wetlands. Other threats to water quality and aquatic life in the basin come from toxics, including the atmospheric deposition of mercury, PCBs, nonpoint source pollution, point source discharges that exceed permit limits and development.

Groundwater is available everywhere in the basin at depths ranging from 5 to 500 feet. Most of the groundwater in the basin comes from sandstone aquifers. North of the Lower Wisconsin River, the majority of groundwater is drawn from a Cambrian sandstone bedrock aquifer. South of the Lower Wisconsin River, groundwater sources come from the Galena-Platteville aquifer and the St. Peter Sandstone aquifer as well as the Cambrian sandstone. Groundwater in the basin is generally hard with a dissolved solid content of between 100 and 400 mg/l (Hindall and Borman, 1974).

LAND COVER AND DEMOGRAPHICS IN THE BASIN

Land Cover: Today, forested land and agriculture are the dominant land covers in the basin (Map 12). Farming consists mostly of dairy, beef and hog operations. In the region formerly Glacial Lake Wisconsin, particularly northeast of Tomah, some of the natural bogs and wetlands have been developed for cranberry production. Cranberries, forestry and dairying are the principal agricultural activities in this region. Approximate square miles of land cover in the Lower Wisconsin River Basin are shown in Table 3 (WDNR Enterprise Information, 1998) (Figure 1).

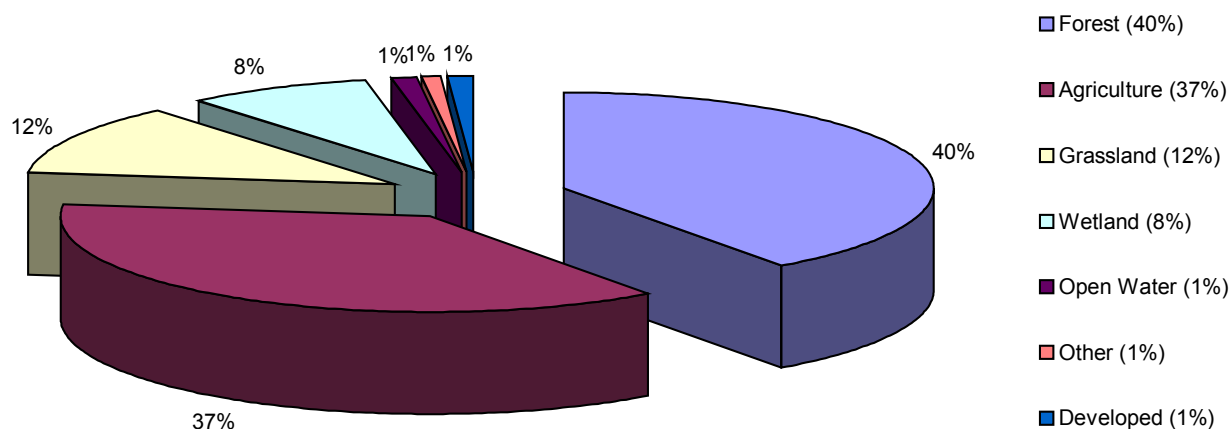
Table 3: Land Cover in the Basin

<i>Land Cover</i>	<i>Area (Square Miles)</i>	<i>Percent</i>
Forest (Total)	1,957	39%
<i>Broad-Leaf Deciduous</i>	1,784	35%
<i>Mixed Deciduous/ Coniferous</i>	88	2%
<i>Coniferous</i>	86	2%
Agriculture	1884	37%
Grassland	620	12%
Wetland (Total)	427	9%
<i>Forested</i>	183	4%
<i>Emergent/Wet Meadow</i>	149	3%
<i>Lowland Shrub</i>	95	2%
Open Water	75	1.3%
Other	50	1.0%
Developed	34	0.7%

Data collected between 1991 and 1993 for the WDNR; <http://www.dnr.state.wi.us/org/at/et/geo/data/wlc.htm>

Map 12: Current Land Cover in the Basin

Figure 1: Land Use in the Lower Wisconsin River Basin



Dane County and Grant County have the highest number of farms in the basin based on 1997 and 1998 data with 3,120 and 2,680 farms respectively (Figure 2). Over the past couple of years, agricultural land in the basin has been sold for uses other than agriculture (Figure 3). Dane County farms saw the greatest percentage, (18%), of all lands converted to uses than agriculture between 1999 and 2000. Other counties, such as Crawford, Iowa, Richland, Grant, and Vernon had land conversions over 10% of the total acres converted to non-agricultural uses at 15%, 14%, 13%, 12%, and 11% respectively (Wisconsin Agricultural Statistics Service 1999, 2000, and 2001).



Farm in the Basin. Photo courtesy of WDNR.

Figure 2: Number of Farms in Counties in the Lower Wisconsin River Basin (1997 - 1998)

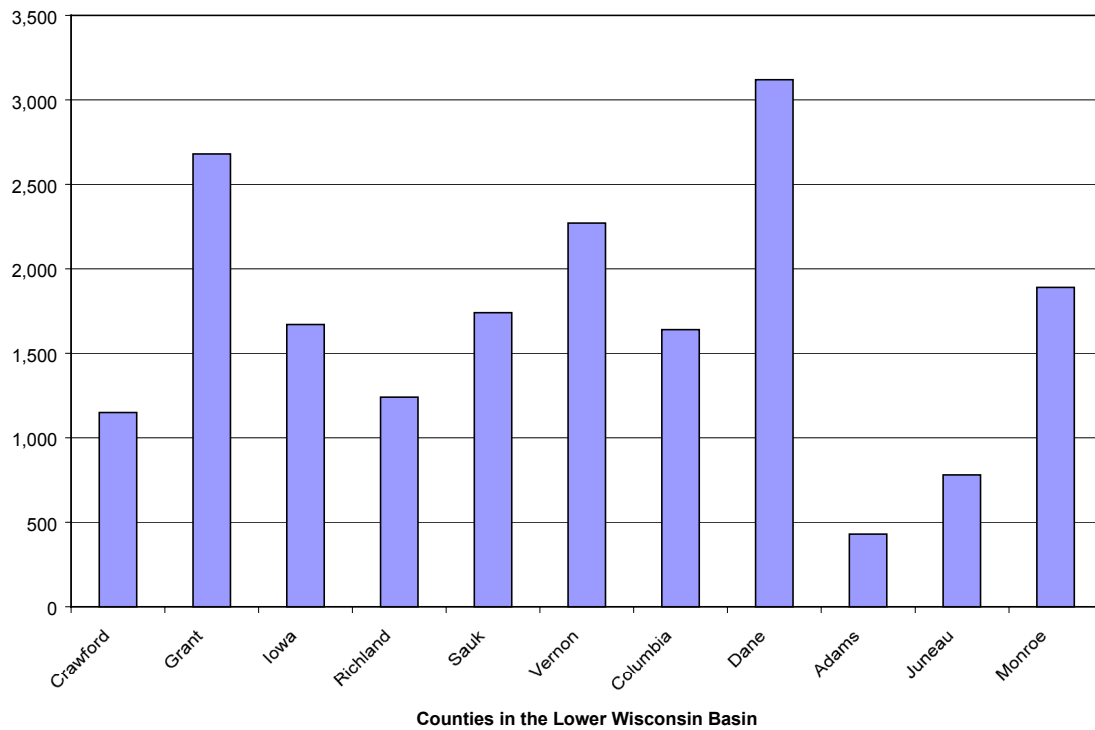
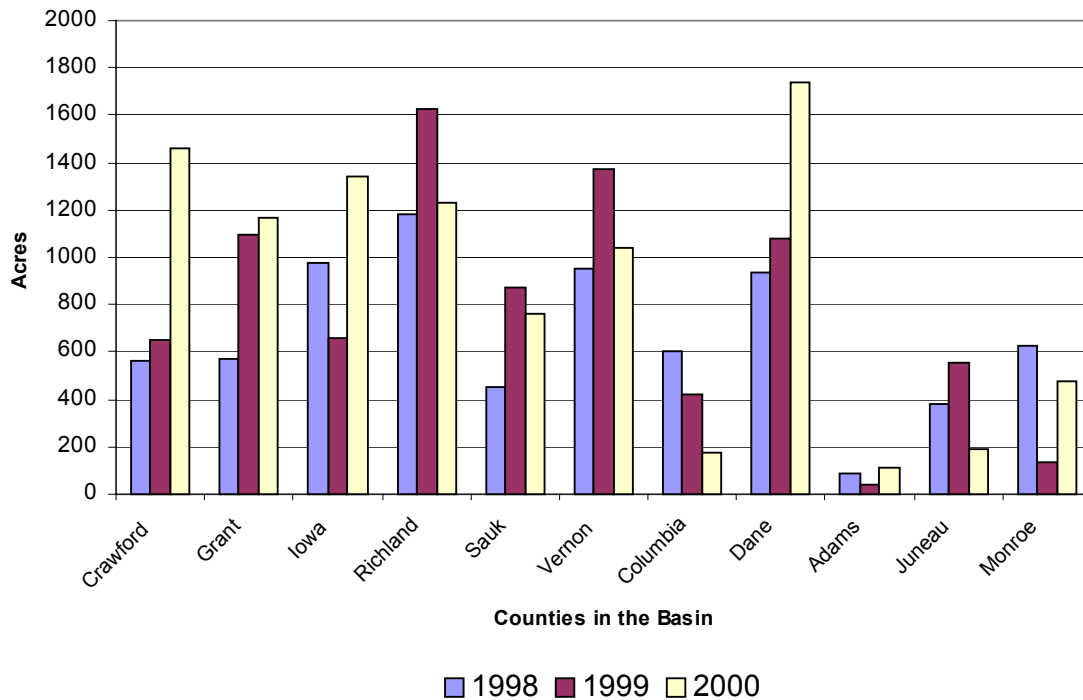


Figure 3: Land (in acres) Sold in Counties in the Lower Wisconsin River Basin for Non-Agricultural Uses (1998 - 1999)



Demographics: There are nearly 200,000 people living in the Lower Wisconsin River Basin. Overall population growth throughout the basin is slow. In many cities, villages and towns, there has not been significant growth in the past thirty years, however, several communities have seen extensive growth over the last decade. The fastest growing areas are the cities and villages in Columbia, Sauk, Iowa and Dane counties, see Table 4. Based on 2000 Census, the City of Baraboo has the largest municipal population in the basin with 10,711. There are only two other cities in the basin with population estimates close to 10,000; the cities of Portage and Tomah with populations of 9,728 and 8,419 respectively. The Lower Baraboo River Watershed is estimated to be the most populated watershed. The Little Lemonweir River Watershed is the second most populous watershed in the basin (Faust, 2000; Wisconsin Department of Administration, 2001).

Table 4: Municipalities with Population Change of 20% or More During the 1990's

<i>Municipality</i>	<i>1990 Census</i>	<i>2000 Census</i>	<i>Percent Change</i>	<i>County</i>
Oakdale	162	297	83%	Monroe
Barneveld	660	1,088	65%	Iowa
Blue Mounds	446	708	59%	Dane
Lone Rock	641	929	45%	Richland
Mount Horeb	4,182	5,860	40%	Dane
Lodi	2,093	2,882	38%	Columbia
Blue Mounds	446	708	37%	Dane
Poynette	1,662	2,266	36%	Columbia
Lake Delton	1,466	1,982	35%	Sauk
Reedsburg	5,834	7,827	34%	Sauk
Cross Plains	2,362	3,084	30%	Dane
Arena	525	685	30%	Iowa
Wauzeka	595	768	29%	Crawford
Dane	621	799	29%	Dane
Avoca	474	608	28%	Iowa
Prairie du Sac	2,546	3,231	27%	Sauk
Ironton	200	250	25%	Sauk
Rio	768	938	22%	Columbia
Loganville	228	276	21%	Sauk

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CHAPTER 4: WATER, LAND AND WILDLIFE RESOURCES OF THE LOWER WISCONSIN RIVER BASIN

GROUNDWATER RESOURCES

There are several distinct geologic areas in the Lower Wisconsin River Basin. The western portion of the basin lies in the “Driftless” region of the state, or the area not covered by the last glacier, while the portions of the basin lying east of the Wisconsin River in Columbia County and parts of Dane County were covered with glacial drift (Map 9, Chapter 3). The northern one-fifth of the basin lies within the boundaries of glacial Lake Wisconsin. The Wisconsin River Valley is characterized by high bedrock bluffs and alluvial deposits in the valley. These different geologic regions all have a different effect on the groundwater resources in those areas (Hogan, 2001).

For the most part, the depth to bedrock in the unglaciated portion of the basin on ridge tops is shallow. Much of Grant, Iowa, and portions of Richland and Sauk counties have limestone or sandstone formations at or near the ground surface. These formations also tend to be highly creviced and fractured. In the river valleys where significant sand and gravel deposits exist, the wells are generally shallow. As a result, both of these areas are more susceptible to groundwater contamination from land use activities. Since this region is predominantly agricultural, often the contaminants found in the groundwater are the result of agricultural land use practices (Hogan, 2001). Some of the documented problems in this region include:

- ◆ Nitrate and bacteriological contamination of wells. This problem is statewide and not specific to the Lower Wisconsin River Basin.
- ◆ Nutrients (especially nitrates in the groundwater as a result of nutrients)
- ◆ Pesticides/herbicides
- ◆ Improperly abandoned or unabandoned wells
- ◆ Substandard well issues including well locations with respect to contamination sources, wells subject to flooding due to improper locations in flood-prone areas, and wells located in pits, basements or alcoves.

In the glaciated portion of the watershed that includes Columbia and parts of Dane County, the depth to the bedrock is much higher than that found in the unglaciated portion of the basin. As a result, groundwater susceptibility is lower. Despite this, however, high nitrate concentrations, most likely as a result of agricultural land use in the region, have been found in many locations throughout the region (Hogan, 2001).

The northern portion of the watershed in Monroe, Juneau, and Adams County is characterized by flat topography with a high sand content in the soil. As a result of this sandy soil, groundwater contamination is a concern. Occasionally, atrazine levels can be high and there are several atrazine prohibition areas in Adams, Juneau and Monroe Counties (Appendix B). High nitrates from fertilizers are also a concern. Occasionally, it is necessary to drill new wells into the deep cambrian sandstone aquifer in order to get drinking water that meets standards (Brock, 2002).

Groundwater in the Wisconsin River valley from the Prairie du Sac dam to the Mississippi River is taken from an alluvial aquifer. The aquifer is made up of coarse grained materials, such as sand and gravel, and is able to generate a good quantity and, for the most part, good quality water. Despite this, however, the aquifer’s shallow nature and geology makes it susceptible to groundwater pollution as a result of activities on the land.

Groundwater Contamination

Groundwater contamination potential varies due to ground cover, depth to water table, bedrock and land use. WDNR has ranked each watershed in the basin to establish its groundwater contamination potential. This ranking was based on land cover and groundwater sample results found in the state's groundwater database. The table below lists each watershed's score and gives a short description of the land cover and groundwater sample analytical data that determined the score. Groundwater contaminants used for the ranking include nitrate and pesticides, as these are common nonpoint source contaminants. A score of 20 to 29.99 is considered medium. At 30 or greater, the score is considered high for groundwater contamination potential. Land cover in the basin consists mostly of forest and agriculture. Only a few watersheds have a representative number of groundwater samples (1 well sampled per 10 square miles) so scores are based on land cover. There are six permitted Confined Animal Feeding Operations (CAFOs) in the basin (Chern, 2002).

Table 5: Potential for Groundwater Contamination - Lower Wisconsin River Basin

<i>Watershed</i>	<i>Score</i>	<i>Comments</i>
Millville Creek (LW01)	33.91	The watershed is 48% forest and 33% agriculture.
Lower Kickapoo River (LW02)	39.95	Land cover in the watershed consists of 47% forest and 39% agriculture.
Reads and Tainter Creeks (LW03)	44.93	The watershed is 44% agriculture and 40% forest.
West Fork Kickapoo River (LW04)	53.00	The watershed is 52% agriculture and 34% forest.
Middle Kickapoo River (LW05)	50.78	Land cover consists of 46% forest and 38% agriculture. There is one CAFO in the watershed. Of 135 wells tested for nitrate, 8% exceeded the ES and 67% exceeded the PAL.
Upper Kickapoo River (LW06)	47.10	The watershed consists of 47% agriculture and 36% agriculture.
Green River and Crooked Creek (LW07)	38.28	Land cover is 45% forest and 37% agriculture.
Knapp Creek (LW08)	36.92	The watershed is 46% forest and 36% agriculture.
Blue River (LW09)	41.60	The watershed is 40% agriculture and 39% forest.
Mill and Indian Creeks (LW10)	47.03	The watershed is 46% agriculture and 39% forest. There is 1 CAFO in the watershed.
Otter and Morrey Creeks (LW11)	41.35	The watershed is 49% forest and 29% agriculture. Of 28 wells tested for nitrate, 7% exceeded the ES and 54% exceeded the PAL.
Willow Creek (LW12)	53.83	Land cover is 42% forest and 40% agriculture. Of 21 wells tested for nitrate, 14% exceeded the ES and 38% exceeded the Pal.
Upper Pine River (LW13)	43.07	The watershed is 42% agriculture and 36% forest.
Bear Creek (LW14)	49.76	Pesticides were detected in 81 wells in the watershed. Of 75 wells tested for nitrate, 26% exceeded the ES and 48% exceeded the PAL. There are 2 CAFOs in the watershed. Land cover consists of 43% forest and 31% agriculture.
Mill and Blue Mounds Creek (LW15)	40.49	Pesticides were detected in 65 wells. Of 61 wells tested for nitrate, 26% exceeded the ES and 47% exceeded the PAL. The watershed consists of 49% forest and 24% agriculture.

<i>Watershed</i>	<i>Score</i>	<i>Comments</i>
Honey Creek (LW16)	62.04	There are 2 CAFOs in the watershed. Pesticides were detected in 25 wells. Of 37 wells tested for nitrate, 24% exceeded the ES and 32% exceeded the PAL. Land cover consists of 43% agriculture and 38% forest.
Black Earth Creek (LW17)	57.72	Pesticides were detected in 54 wells. Of 57 wells tested for nitrate, 16% exceeded the ES and 49% exceeded the PAL. The watershed is 43% agriculture and 37% forest.
Roxbury Creek (LW18)	55.88	Pesticides were detected in 40 wells. Of 73 wells tested for nitrate, 19% exceeded the ES and 38% exceeded the PAL. Land cover is 43% agriculture and 31% forest.
Lake Wisconsin (LW19)	64.59	Pesticides were detected in 62 wells. Of 86 wells tested for nitrate, 22% exceeded the ES and 56% exceeded the PAL. The watershed is 45% agriculture and 26% forest.
Duck Creek and Rocky Run (LW20)	62.71	Pesticides were detected in 47 wells. Of 44 wells tested for nitrate, 34% exceeded the ES and 45% exceeded the PAL. Land cover in the watershed is 46% agriculture, 18% wetland, 17% forest and 15% grassland.
Lower Baraboo River (LW21)	47.28	Pesticides were detected in 24 wells. Of 20 wells tested for nitrate, 15% exceeded the ES and 50% exceeded the PAL. The watershed is 32% forest, 16% wetland, and 29% agriculture.
Narrows Creek and Baraboo River (LW22)	64.51	Pesticides were detected in 19 wells. Of 322 wells tested for nitrate, 18% exceeded the ES and 64% exceeded the PAL. The watershed is 49% agriculture and 31% forest.
Crossman Creek and Little Baraboo River (LW23)	57.09	Of 28 wells tested for nitrate, 14% exceeded the ES and 46% exceeded the PAL. The watershed is 46% agriculture and 29% forest.
Seymour Creek and Upper Baraboo River (LW24)	53.41	Land cover in the watershed consists of 52% agriculture and 29% forest.
Duck and Plainville Creeks (LW25)	42.55	Pesticides were detected in 69 wells. Of 97 wells tested for nitrate, 28% exceeded the ES and 33% exceeded the PAL. The watershed is 51% forest and 26% agriculture.
Dell Creek (LW26)	47.05	Pesticides were detected in 19 wells. Of 64 wells tested for nitrate, 37.5% exceeded the ES and 42% exceeded the PAL. The watershed is 45% forest and 34% agriculture.
Lower Lemonweir River (LW27)	48.83	Pesticides were detected in 25 wells. Of 40 wells tested for nitrate, 17% exceeded the ES and 42% exceeded the PAL. The Watershed is 40% forest and 34% agriculture.
Beaver Creek/Juneau (LW28)	8.11	The watershed is 42% wetland, 36% forest and 8% agriculture.
Little Lemonweir River (LW29)	57.65	Pesticides were detected in 47 wells. Of 54 wells tested for nitrate, 24% exceeded the ES and 57% exceeded the PAL. Land cover consists of 38% agriculture and 31% forest.

Abbreviations include:

1. ES: Groundwater enforcement standard as per NR 140 Wis. Adm. Code. For nitrate the groundwater ES is 10 ppm.
2. PAL: Groundwater Preventive Action Limit as per NR 140 Wis. Adm. Code. For nitrate the groundwater PAL is 2 ppm.
3. CAFO: Confined Animal Feeding Operation that consists of the equivalent of 1000 animal units.

There are several sites of specific groundwater concern in the basin. One of these is the result of an extensive contaminant plume that emanates from a leaking underground storage tank site (LUST). As a result of this plume, methyl tertiary-butyl ether, (MTBE), has been found in one of Spring Green's municipal wells (Ales 2001). So far, the level of MTBE has been far below the drinking water standard and the aesthetic standard set by the EPA. The plume and the contaminant concentrations are being closely monitored. There are several other LUST sites in the basin that have caused minor groundwater contamination problems. Another concern in the Wisconsin River Valley, especially from Lone Rock to Mazomanie, includes high nitrate concentrations in shallow public and private wells. These nitrates enter the groundwater as a result of fertilizer applications on agricultural lands, septic systems and several other sources (Maag, 2001).

Atrazine, one of the most widely used herbicides in the United States to control weeds in corn fields, can leach into the groundwater and affect the health of humans if consumed in certain quantities over a lifetime. Currently, the EPA has set the drinking water health limit for atrazine at 3 parts per billion (ppb). Atrazine and its metabolites (breakdown products) have been determined to be a problem in areas in the basin, including but not limited to the Wisconsin River Valley. As a result, DATCP has prohibited the use of Atrazine in highly susceptible regions throughout the basin. For a complete list of townships and counties that lie in an Atrazine prohibition zone, please see Appendix B (WDATCP 2001).

The site of the closed Badger Army Ammunition Plant is another location of groundwater concern in the basin. The plume that has resulted from previous activities at the plant extends south and east from the site and travels between 3 and 4 miles toward the Wisconsin River below the Prairie du Sac dam. The contaminants were found in local private wells that were in the path of the plume and included carbon tetrachloride, chloroform and trichloroethylene. These wells have since been replaced and are safe. The Army is taking aggressive steps, including pumping and treating the groundwater and employing bioremediation techniques, to clean up the site (Ales 2001)

In addition to Spring Green, there are several other public water supply systems that are threatened by sources of contamination. Cazenovia has a sandstone well that is approaching the nitrate standard of 10 mg/L. The well so far has been below this standard at 7.5-9.5 mg/l (Maag, 2001). The village continues to watch this well carefully. Fennimore recently abandoned one well due to a persistent bacteria problem. This well has been replaced and is producing safe water. Lodi drilled a new well to replace an old well that was approaching the standard for atrazine.

Wellhead Protection Planning

Wellhead protection planning can be used to protect groundwater. The goal of a wellhead protection plan is to protect public wells from contamination by controlling land use in groundwater recharge areas and in the area around the well. There are numerous municipalities in the basin with approved wellhead protection plans and many more that have applied (Barnum, 2001). See Table 6.

Table 6: Approved Wellhead Protection Plans (September 2001)

<i>Municipality</i>	<i>Watershed</i>	<i>Date Approved</i>
La Farge	LW05	12/23/1996
Norwalk	LW06	04/23/2001
Fennimore	LW09	02/10/1998
Montfort	LW09	10/13/2000
Richland Center	LW12	10/25/2000
Prairie du Sac	LW16	05/15/1996
Lodi	LW19	12/18/2000
Pardeeville	LW20	04/06/1994
Elroy	LW24	12/22/1994
Lake Delton	LW26	08/16/1994,04/03/2001
Hustler	LW29	05/18/1994
Oakdale	LW29	11/11/1996
Tomah	LW29	02/07/1996

Ensuring a Healthy Drinking Water Supply

Groundwater is an extremely important resource in the basin and one that must be taken care of to insure a safe drinking water supply. It is imperative that the WDNR work with the NRCS, county LCDs, UW-Extension, the USGS, conservation organizations and private citizens to identify and remove all threats to their drinking water supply. Some of these threats include improperly abandoned (or unabandoned) or constructed wells, improperly located wells, animal waste storage units, and improper applications and storage of fertilizers and pesticides/herbicides. Partners in the basin should promote well driller education, proper well abandonment, frequent well water testing, wellhead protection planning and nutrient and pesticide management.

AQUATIC RESOURCES

Surface Water Resources

The Lower Wisconsin River Basin is rich with surface water resources including approximately 3,800 miles of streams and numerous lakes. Despite the large number of lakes in the basin, many of these lakes are not “natural” lakes. In the portion of the basin that lies in the region of the ancient glacial Lake Wisconsin, specifically northeastern Monroe, southeastern Jackson and western Juneau counties, most of the “lakes” are man-made. Many of these flowages and impoundments were created to support cranberry cultivation, to drain land for farming, to provide water power to drive small grist mills, or to provide recreation, flood control and/or lakefront residential property. Many of these impoundments are shallow and have little fishery value, however, some have important wildlife values.

Other surface water features in the basin are backwater sloughs and cutoffs formed by the Wisconsin River. Many of these backwater sloughs and cutoffs or lakes lie along the Wisconsin River from Sauk City to Wyalusing State Park. These areas are locally important fishery areas that provide valuable for wildlife habitat for migratory waterfowl and a large variety of game and nongame species. Many of these shallow lake systems are usually unique and can have intensive

and diverse aquatic vegetation growth, the tendency not to winterkill and the likelihood of remaining open all winter.

Outstanding and Exceptional Resource Waters

Overall, water quality in the Lower Wisconsin River basin is generally considered to be good. The streams in the basin that are considered of good quality and support valuable fisheries, unique hydrologic or geologic features, outstanding recreational opportunities, or have pristine environmental settings that are mostly unaffected by human activities, have been designated as Exceptional or Outstanding Water Resources (ERW/ORW). A statewide listing of these streams can be found in NR 102, Wis. Adm. Code.

Outstanding Resource Waters (ORW) have the highest value as a resource, excellent water quality and high quality fisheries. They do not receive wastewater discharges and point source discharges will not be allowed in the future unless the quality of such a discharge meets or exceeds the quality in the receive water. The classification includes national and state wild and scenic rivers and the highest quality Class I trout streams in the state. **Exceptional Resource Waters (ERW)** have excellent water quality and valued fisheries but already receive wastewater discharges or may receive future discharges, if necessary to correct environmental or public health problems. This classification includes Class I trout streams as identified in the 1980 Wisconsin Trout Streams book. There are presently approximately 373 miles of ERW streams in the basin. For a complete list of ORW/ERW streams, see Appendix C and Map 5 of Chapter 1.

Impaired Waters and Total Maximum Daily Loads (TMDLs)

Despite the many miles of ERW/ORW streams in the basin, there are also 114 miles of streams and two lakes that have impaired water quality as defined by the USEPA's standards of fishable and swimmable waters. In 1998, the WDNR, as required by Section 303(d) of the Federal Clean Water Act, identified and submitted a list of impaired Wisconsin waterbodies to the USEPA. The list is known as the 303(d) list. The cause of impairment on a waterbody may include nutrients, sediments, pollutants from point and/or nonpoint sources, airborne pollutants, contaminated sediments and physical or habitat degradation. See Appendix D and Map 5 of Chapter 1.

For more information on the Impaired Waters List:

<http://www.dnr.state.wi.us/org/water/wm/wqs/303d/303dhome.html>

The WDNR is responsible for the improvement of the waters on the list. One strategy that the state has considered is the Total Maximum Daily Load (TMDL) strategy. This strategy identifies and analyzes pollutant problems and develops an implementation plan to improve water quality by addressing those problems. The implementation plan will utilize existing WDNR programs and activities. It is important to note that listing a water will not automatically translate to implementation of a TMDL for that waterbody. The method by which the WDNR implements the TMDL activity will depend upon the nature of the impairment and the program structure or activity available at the time. Currently, a TMDL strategy is being developed for Fennimore Fork (Castle Rock Creek) in the Blue River Watershed.

Wetlands

Only 53% of the state's original 10 million acres of wetlands remain today. Of these, 5.3 million wetlands or approximately 75%, are in private ownership. Many of these wetlands are threatened by changing land use, invasive and non-native species, such as purple loosestrife, polluted runoff, and the overuse of groundwater supplies (WDNR, December 2000).

Wetlands are a critical piece needed to maintain a healthy ecosystem. They not only provide habitat for a variety of plants and animals, water storage to prevent flooding and protect water quality and shoreline, groundwater recharge and discharge, and they also provide recreational opportunities for wildlife watchers, anglers, hunters, and boaters.

Approximately 3.5% of the Lower Wisconsin River Basin is covered by wetlands. The most common type of wetland in the basin is forested which are characterized by trees 20 feet or more in height and include bogs and forested floodplain complexes. The second most common type is emergent or wet meadow wetlands. These wetlands typically have saturated soils rather than standing water. Common plants are sedges, grasses and reeds although many other plant species can be found as well. Another type of wetland common in the basin is scrub/shrub wetlands which are characterized by woody shrubs and small trees.

Wetland restoration and protection in the basin is critical to preserving what is left of these important communities. The NRCS Wetland Reserve Program can help landowners protect, restore and enhance wetlands while retaining ownership and access to the land. In addition, the state has developed a strategy for "Reversing the Loss" of wetlands in the state. The strategy relies on effective partnering between state and federal agencies and local citizens to protect and improve upon the remaining wetlands in the state.

For more information on wetlands:

<http://www.dnr.state.wi.us/org/water/fhp/wetlands/index.htm>.

Fisheries

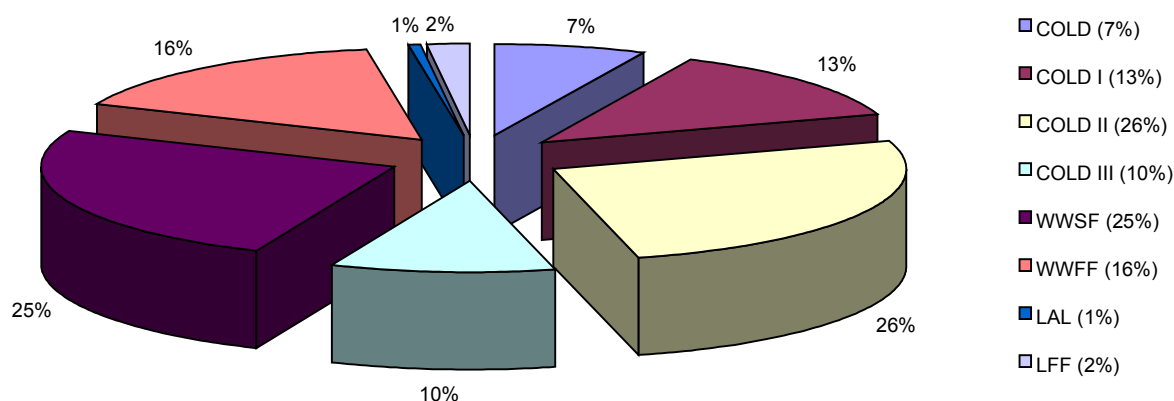
Fishing is a very popular recreational activity in the Lower Wisconsin River Basin. The basin's many streams offer anglers a variety of fishing options. There are approximately 3,800 miles of streams in the basin. Of these streams, approximately 1,104 miles of streams in the basin are considered cold water sport fishery (trout) waters. Another 570 miles are warm water sport fishery waters. WDNR, however, lacks existing use classification information for more than 1,500 of the total stream miles in the Lower Wisconsin River basin. Most of this unknown stream mileage is made up of very small, unnamed tributaries or the headwater reaches of named streams above areas where the WDNR does have information. See Figure 4.



Brook Trout (Salvelinus fontinalis)

Drawing courtesy of Virgil Beck, WDNR.

Figure 4: Percent of Type of Fishery Based Upon Classified Stream Miles



Special Aquatic and Fisheries Resources

Lower Wisconsin Fishery

The 92-mile stretch of river from Prairie du Sac to the Mississippi River supports a rich diversity of fish, mussels, herptiles and aquatic insects. Fish species accounts indicate that the Wisconsin River and its backwaters support up to 95 native fish species. Of these 95 species, nineteen are state threatened or endangered species and some of the 95 species are specific hosts for the glochidial stage of a number of rare, threatened and endangered freshwater mussels. In addition, eight species represent primitive or ancient "living fossil" forms, including Paddlefish and Lake Sturgeon. For more information, see the Lower Wisconsin River Main Stem Narrative in Section Two of this report.

In addition to the special, threatened, and endangered fish species in the Lower Wisconsin, the river is also home for unusual and rare insects and a variety of threatened or endangered amphibians and reptiles. There are eight species of mayflies (Ephemeroptera) and four species of beetles (Coleoptera) that are found almost exclusively in the river. In addition, during a Wisconsin River aquatic insect survey, a couple of rare dragonflies were also found (Sims, 2000).

Rare, Threatened, and Endangered Aquatic Species in the Lower Wisconsin River

There are a variety of other aquatic plant, animal and insect species in the Lower Wisconsin River Basin that have been designated by the state of Wisconsin as threatened, endangered, or a species of concern. Many of these organisms can be found in the Lower Wisconsin River. These elements are listed on the Wisconsin Natural Heritage Inventory (NHI). The Bureau of Endangered Resources maintains the NHI, established in 1985. The NHI is used to determine the existence and location of rare species, natural communities and natural features in Wisconsin, including endangered and threatened species and special species of concern in the basin. For a complete list of these species found throughout the basin, please see Appendix E (Bleser, 2001).

Threats to Aquatic Resources

Although there are many healthy aquatic resources in the basin, these resources almost all are threatened. The primary threats to these resources are stormwater runoff and nonpoint sources of pollution, particularly from agricultural operations, urban areas, new development, and hydrologic modifications such as dams, stream straightening, and the ditching, draining or other alterations of wetlands. Other factors that potentially impact aquatic resources in the basin include point source discharges to surface water, toxic substances, excessive populations of rough fish that increase sedimentation and turbidity, and non-native or invasive plants and animals.

Stormwater Runoff and Nonpoint Sources of Pollution

Stormwater runoff and nonpoint source pollution are the biggest threats to the quality of the aquatic resources in the basin and occurs when water from rainfall, snowmelt, or irrigation runs over the land and picks up pollutants, and deposits them into rivers, lakes, sewer systems, or groundwater. There are many sources of pollution in the basin. Due to the high percentage of land in the basin used for agricultural purposes, much of the runoff comes from cropland erosion and barnyards. Other major sources of runoff in the basin come from urban areas, including construction sites and urban storm sewers. Urban stormwater can be laden with sediment, chloride, pesticides, nutrients, bacteria, heavy metals and other toxic materials. Streambank erosion also contributes a high volume of sediment to streams in some locations (Bertolacini, 2002).

The nutrients found in nonpoint source pollution and stormwater runoff can increase the productivity in the water and cause an increase plant and algae growth. In addition, sediment can silt over in-stream habitat and cause changes in the overall ecosystem. These sediments and the increased plant growth in the stream, lake or river, will eventually increase the turbidity of the water. Chemicals and other toxins can create an unhealthy aquatic environment for plants and animals.

As a result of the serious effects of nonpoint source pollution on both the health of the water and the health of the land in the basin, the watersheds in the basin have been ranked by the WDNR as priorities for nonpoint source pollution abatement projects. The ranking identifies priority watershed areas where nonpoint sources of water pollution exist and are a threat to water quality or habitat and where the problem can be controlled and/or corrected through best management practices. This ranking was derived through a process of evaluating the water quality of streams, lakes and groundwater. The rankings can be found in Appendix F. As a result of insufficient data on surface water quality, three of the 29 watersheds in the basin are unable to be ranked.

A number of individual streams or lakes and their subwatersheds are also being recommended as high priority candidates for possible small-scale priority project or lake project selection (Table 7). Small-scale priority watershed projects are appropriate when nonpoint source based water resource problems are limited to an individual lake, stream or groundwater area of concern of approximately 10 square miles or less.

Table 7: Areas Ranked High for Small Scale Priority Projects under the Nonpoint Source Program

<i>Stream or Lake</i>	<i>Watershed</i>
Gran Grae Creek	LW01
Hoover Hollow, Richland, and West Fork Knapp creeks	LW08
Hoosier Hollow Creek in the Mill and Indian Creek watershed	LW10
Harker and Otter Creeks	LW11
Basswood, Champion Valley, Gault Hollow, Hanzel, Hawkins, Hynek Hollow, Melancthon and Soules Creeks, Grinsell Branch, and the West Branch Pine River	LW13
Biser, Marble, and McCarrville creeks	LW14
Elvers, Ryan, and Trout creeks	LW15
Vermont Creek	LW17
Rowan Creek	LW19
Rocky Run	LW20
Leech Creek	LW21
Hillsboro Lake	LW24
Brewer, Little Onemile, and Onemile creeks, and the unnamed tributary to Onemile Creek	LW27

Nonpoint Source Water Pollution Abatement Program

Wisconsin's Nonpoint Source Water Pollution Abatement Program provides grants to local governmental units, in watersheds selected for priority watershed projects. Grants can reimburse a portion of the cost of installing best management practices, which reduces the amount of nonpoint source pollution that reached the streams, rivers and lakes in the basin.

The Priority Watershed Program (PWS) is a joint effort of the WDNR, Department of Agriculture, Trade and Consumer Protection (DATCP), the University of Wisconsin Extension (UWEX), counties (usually through their Land Conservation Departments), municipalities, and Lake Districts.

In 1978 the first priority watershed project was selected in Wisconsin and over the years the program evolved as a nationally recognized watershed based approach. Funding considerations and changes to Wisconsin's law have now shifted the program's focus to smaller drainage areas. Grants are targeted towards degraded waters and provide funding assistance to construct and install BMPs. Proposed new changes to Wisconsin law and administrative rules are now aimed at developing agricultural and urban standards of performance designed to help achieve water quality standards in these areas. The new standards will be applied statewide, but only when cost sharing dollars are available to assist landowners with the cost of compliance.

Want to know more about the Priority Watershed Program?
<http://www.dnr.state.wi.us/org/water/wm/nps/npsprogram.html>

Currently, there are a number of watershed scale and small-scale nonpoint source priority watershed projects active in the basin. The large-scale projects include Narrows Creek - Baraboo River in Sauk County, Richland and Juneau counties, Middle Kickapoo River watershed in Vernon and Richland counties and Dell Creek in Sauk and Juneau counties. Small-scale projects in the basin are the Lake Tomah project in Monroe County, Hillsboro Lake in the Seymour Creek and Upper Baraboo River Watershed and Dunlap Creek in the Roxbury Creek Watershed in Dane County.

In addition to the PWS Program, grants are available through the state for Targeted Runoff Management (TRM) Projects. Local units of government can apply for funds to undertake construction or implementation of best management practices to control nonpoint source pollution. These projects are generally short-term, and must be completed within one year. Other state programs exist to address nonpoint sources of pollution. For more information, see Chapter 5: Natural Resources Management Programs.

Point Source Pollution

Wastewater discharges in Wisconsin are regulated through the Wisconsin Pollutant Discharge Elimination System (WPDES) administered by the WDNR. These point sources of discharge, both municipal and industrial, are no longer the water quality problem they once were in the Lower Wisconsin River Basin. This is due to a number of factors including the millions of public tax dollars which have gone into improving existing facilities and building new ones, the compliance maintenance program which requires municipal facilities to evaluate plant performance yearly, toxic screening and other toxic programs which have sought to reduce the amount of toxic materials released into surface water, and regular inspections by WDNR wastewater management engineers. Individual facilities may have occasional or even persistent problems, but these are addressed through the various programs and procedures of the Wastewater Management program.

An inventory of and information about municipal and industrial wastewater treatment plants in the basin can be found in Appendix G (Behlen, Edwards, Harpt, Heim, Jablonski, Lemke, Osipoff, Pfefferkorn, Vollrath, 2000). The Dane County Regional Planning Commission is the designated water quality planning agency for Dane County. Additional information on municipal discharges in the Lower Wisconsin River Basin portion of Dane County can be found in Appendix C of the *Dane County Water Quality Plan*. That plan should also be consulted for any additional recommendations for point source discharges in the Dane County portion of the basin.

Dams and Impoundments on Streams and Rivers

Many of the streams and rivers in the basin have been impounded, either for electric power generation or for recreational purposes. These dams and impoundments are especially susceptible to nonpoint source pollution, can be very costly to maintain, and often suffer from a variety of water quality problems that ultimately limit their potential for recreation. Sediment, phosphorus and other nutrients make their way to the impoundment. The sediment increases turbidity in the water column, while the nutrients increase the growth of rooted aquatic plants and attached algae, and free floating bluegreen algae. In addition, the nutrients and increased plant growth can increase the daily and seasonal oxygen fluctuations and may increase the

chance for winterkill of fish. Rough fish that live in these degraded systems often make the problems worse by uprooting established plant beds and re-suspending bottom sediments and nutrients. The impoundment can affect the quality of water downstream as well. The impoundment acts to slow and warm the water. As the water is released downstream, that water not only warms the water below the dam, but also carries sediment and nutrients downstream.

Dams and impoundments can also have a detrimental effect on fish populations. These obstructions can block migrating fish from reaching ideal spawning habitat. This segmentation of riverine systems has had an impact on numerous fish species in the Lower Wisconsin River Basin.

Beaver activity and the damming of streams, similar to large-scale impoundments, can also have a negative impact on streams, especially trout streams. Dams are built on most trout streams annually. The impoundments warm the water to lethal temperatures for trout and cause sedimentation of the rock riffle areas that provide spawning substrate and habitat for aquatic insect larvae, a primary trout food (Larson, 2001).

Cranberry Culture

The Lower Wisconsin River Basin contains numerous commercial cranberry operations. These operations are located in the vicinity of Warrens and Mather north and east of Tomah in the Beaver Creek Watershed. Cranberry operations can be a source of water quality problems including elevated stream water temperatures and the presence of pesticides released from the cranberry marshes after pesticide applications.

Potential adverse water quality impacts from commercial cranberry marsh expansion or new marsh construction includes the elimination or alteration of natural wetlands, increases in downstream temperatures and other water quality impacts due to marsh discharges. Overall the WDNR does not have much information on the impact that discharges from commercial cranberry operations have on stream water quality in the basin.

Toxics

Toxic substances in surface water and in lake and stream bottom sediments are now recognized as a serious problem throughout the country. Through a process known as bioaccumulation, these substances increase at each level of the food chain with the highest levels usually seen in top level predators such as fish. Contaminants in fish, such as mercury and polychlorinated biphenyls, (PCB's), can sometimes reach levels that pose health problems to people who eat them.

Mercury is naturally occurring and found everywhere in the environment. Additional inputs of mercury, typically from coal burning utilities and incinerators, can find their way to rivers and lakes through atmospheric deposition. While this is not a major problem in the Lower Wisconsin River basin, all fish contain some levels of mercury. Therefore the state has issued a general, statewide consumption advice for eating fish from all waters. Several waterbodies in the basin have been tested and the presence of mercury has been confirmed (Appendix H).

General Advisory for Mercury

- ◆ Women of childbearing age and children under 15 can eat one meal per week of panfish (yellow perch, crappie, bluegill and bullhead) and one meal per month of walleye, northern pike, bass, catfish, carp or other species.
- ◆ Women beyond childbearing age and men can eat unlimited amounts of panfish and one meal per week of other species

Fish species in numerous waterbodies in the basin have also been tested for contamination due to elevated levels of PCB's. The source of PCB's to the Lower Wisconsin River is mostly due to historical discharges, particularly from paper manufacturers. PCBs are typically found at higher levels in fatty fish like carp, catfish, white bass, and sturgeon. Waterbodies in the basin have been tested for PCB contamination and these tests have led to special fish consumption advisories for PCB's in certain waterbodies for specific fish. See Appendix H for a listing of all waterbodies in the Lower Wisconsin River Basin that have been tested for contamination and for any special advisories (Amrhein, 2001).

For more information on the Fish Consumption Advisory:

<http://www.dnr.state.wi.us/org/water/fhp/fish/advisories>

Aquatic Non-native and Invasive Species

Invasive species can be either native to an area, or a non-native species that was introduced to that location. Invasive species threaten Wisconsin's waters and wetlands by reducing the diversity or abundance of native species, disrupting the ecological stability of aquatic and land ecosystems, hampering boating, swimming and other water recreation, and taking an economic toll on commercial, agricultural and aquacultural resources.

In the Lower Wisconsin River Basin, several of these species threaten the integrity of natural aquatic areas. Purple loosestrife is a major threat to basin wetlands and Eurasian watermilfoil can be found in lakes in the basin and has been significant in altering the ecological balance of many lakes including Fish Lake, Devil's Lake, and Long Lake (near Lone Rock). Another potential threat in the future is from zebra mussels. Zebra mussels are fortunately not yet found in the basin. If these invasive mussels make it into area surface waters, they will have a tremendous impact on basin ecosystems (Marshall, 2000-2002).

Major Aquatic Resource Projects

The WDNR is conducting several projects in the basin to assess water resources and address water management options and concerns.

Lower Wisconsin River Fisheries Plan

The Lower Wisconsin River is an important natural resource. In response to its local and national significance, and the historical and current threats to the river, a fisheries plan was developed by the WDNR to address management issues for the aquatic resources in the portion of the river from the Kilbourn Dam in the Wisconsin Dells to the Mississippi River. For more information on this plan see the Lower Wisconsin River Main Stem Narrative in Chapter 6 of this report.

Wild Trout Reintroduction

Wild trout stocking is an attempt to improve trout populations in streams that depend on stocking to provide a fishery. “Wild” fingerlings are produced by taking eggs from native trout rather than from domesticated hatchery brood stock. The fingerlings are hatched and reared in the hatchery and stocked in the spring or fall. Initial results indicate that these “wild” trout have a two to three time better survival after one year in some streams. In some cases, these wild stock trout may establish a self-sustaining population. One negative factor is that the wild brown trout do not grow as fast in the hatchery as native fingerlings in the wild. In addition, only half as many wild trout can be stocked as domesticated fish, because the wild strain cannot be crowded as much in the hatchery as the domestic strain (Larson, 2001).

Cold Water Habitat Evaluation for Impoundments and PL566 Impoundment Study

The Cold Water Habitat Evaluation Study from 1999 to 2001 examined the effect of impoundments of White Mound Lake, Birch Lake and Blackhawk Lake. The monitoring was conducted above and below Blackhawk Lake (Otter Creek) and Birch Lake (Trout Creek) and demonstrated the significant impacts of the dams. As a result of the dams, temperature and nutrients in the creeks increased and benthic invertebrate and fish communities were altered. On Honey Creek at White Mound Lake, monitoring found that bottom discharge from the lake is septic and supports prolific growths of filamentous bacteria and fungi. The results of the survey will lead to management options for the improvement of these impoundments and the water quality downstream (Marshall, April 2001).

A new study, the PL566 Impoundment Study, has been initiated and builds on the above project. In partnership with NRCS and UW-Platteville Engineering, WDNR is looking at impoundment structure re-design to reduce the impacts of these impoundments and to help create better trout streams downstream of the impoundments (Marshall, 2000-2002).

Shallow Water Initiative Project

The WDNR has been monitoring several sloughs along the Wisconsin River to study the fishery and water quality of the sloughs. Slough monitoring is an ongoing effort to evaluate an important link between the main river channel and riparian areas. The sloughs support numerous rare and endangered fish and herptiles. The monitoring began during 1998 and 1999 and the WDNR plans to continue this monitoring through 2001 and 2002. The sloughs include Long Lake (Sauk county), Avoca Lake (Iowa County) and Jones Slough (Grant County). This monitoring has found long term water quality problems in Jones Slough, including low oxygen levels due to an upstream bottom discharge structure. Low oxygen levels have also been found in Avoca and Long Lakes. The low oxygen levels reflect both natural impacts of wetlands drainage and unnatural effects of shallow impoundments (Marshall, 2000-2002).

Baseline Monitoring

A new statewide "baseline" biological monitoring program was initiated in 1999. Baseline monitoring is a systematic means for WDNR to address its data and information needs. Baseline streams will be monitored every five years at the same locations. Baseline monitoring is to help identify a “baseline” condition of the waterbody. Based upon this information, water quality, habitat and biological trends in the stream or lake can be monitored. Baseline monitoring has been initiated in lakes, wadable streams and nonwadable streams. Wadeable stream monitoring

includes fish surveys (game and non-game species), macroinvertebrates (aquatic insects), water chemistry, streamflow measurements and habitat assessments. Nonwadeable stream monitoring includes fish surveys, macroinvertebrate and water chemistry sampling, and habitat assessments. Monitoring is critical to identifying the problems that affect a particular waterbody and are the key to improving water quality and habitat throughout the basin (Fix, 1994; Voss, 2001).

Long Term Trends Monitoring

There are four sites in the Lower Wisconsin River Basin that are a part of the statewide Long Term Trend Monitoring program. The program began in the summer of 2001 and monitors various waterbodies in the state on a monthly to quarterly basis. The data gathered through this monitoring effort provides consistent, long-term monitoring data that is suitable for analyzing trends and general water quality conditions in some of the state's most major rivers. This type of data also enables comparisons across the state that may reflect how changes in land use and how changes in the hydrology have affected or may affect the waterbody (Sorge, 2001).

The sites in the Lower Wisconsin River Basin that are involved in the monitoring project include the Wisconsin River at Wisconsin Dells and Muscoda, the Baraboo River below Baraboo and the Kickapoo River at Steuben. Nutrients, metals, and a variety of other parameters are monitored at each of these sites.

Impaired Waters Monitoring Project

The goal of this project was to update the EPA's list of impaired waters in the Lower Wisconsin River Basin (303(d) List). Data was collected during the summer of 2001 on streams in the Lower Wisconsin River Basin that are currently on or have the potential to be added to the EPA's List of 303(d) Impaired Streams. Data collection focused on early morning dissolved oxygen (DO) levels and temperature readings and the completion of a habitat rating form for various reaches of each stream (Table 8) (Derkowski, 2001).

Table 8: List of Streams Monitored for the Impaired Water Monitoring Project

Saunders Creek (LW07)	Marble Creek (LW14)
Knapp Creek (LW08)	McCarville Creek (LW14)
Blue River (LW09)	Bohn Creek (LW15)
Castle Rock Creek (Fennimore Fork) (LW09)	Moen Creek (LW15)
Unnamed Tributary to Blue River (LW09)	Unnamed Tributary to Bohn Creek (LW15)
Byrds Creek (LW10)	Garfoot Creek (LW17)
Core Hollow Creek (LW10)	Vermont Creek (LW17)
Hoosier Hollow Creek (LW10)	Babb Creek (LW23)
Indian Creek (LW10)	Carr Valley Creek (LW23)
Jacquish Hollow Creek (LW12)	Cazenovia Branch (LW23)
Little Willow Creek (LW12)	Crossman Creek (LW23)
Hawkins Creek (LW13)	Furnace Creek (LW23)
Horse Creek (LW13)	Silver Creek (LW23)
Hynek Hollow Creek (LW13)	

Conservation Reserve Enhancement Program (CREP)

This program provides landowners the opportunity to voluntarily enroll agricultural land in conservation practices. The conservation practices include filter strips, riparian forest buffers, small wetland restoration and grassed waterways. The goal of the program is to protect environmentally sensitive land, increase wildlife habitat and protect streams, lakes and rivers by reducing runoff and erosion. For more information on the economic incentives offered to landowners, see Chapter Five: Natural Resources Management Programs.

LAND RESOURCES

Major Plant Communities in the Lower Wisconsin River Basin

Prior to European settlement, the vegetation in southwestern Wisconsin was a mixture of forest, open oak forest, and true prairie (short and tall grass prairie). These three vegetation types occupied 60%, 25% and 15% respectively (Curtis, 1959). The pre-settlement landscape of the Lower Wisconsin River Basin was greatly influenced by fire occurrence. These fires, both natural and managed, were the controlling force for perpetuating oak forest and prairie (Curtis 1959). After European settlement, much of the oak openings, savannas and prairie were either placed under plow or allowed to develop into fully stocked oak woodlands. This land use between 1830 and 1950 changed the landscape from a forest-open prairie mosaic to one dominated by agriculture.

Forests

By the early 1950's, the forest acreage had been reduced in the Lower Wisconsin River Basin from the pre-settlement levels of up to 80% forested to less than 20-25% of the total acreage having forest cover. From the 1950's to today, the forests of the Lower Wisconsin River Basin have been increasing in acreage. Forest acreage in the Lower Wisconsin River Basin has increased from the lows of the early 1950's of around 624,000 acres to over 924,000 acres of forest today (Amiel 2000-2001). Today, approximately 40% of the basin is forested. Most of this increase in forest acreage can be attributed to the idling of pastures and small farm fields (Amiel, 2000-2001). Despite some increases in forest acreage, however, it is important to note that much of the forest acreage is fragmented. Also during this time period, the cessation of fires has led to changes in the species composition of the forests and today, many species can be found that were not common during the Native American era.

The forest in the basin is concentrated in the Driftless area, specifically in areas with steep slopes and narrow drainages. Forest in the Lower Wisconsin River Basin is composed predominantly of oak-hickory and maple-ash-basswood with smaller tracts of elm-ash-cottonwood (bottomland hardwoods), red and white pine and other scattered forest types (Table 9). The loss of natural fires on the landscape, light selective harvest by landowners and loggers, and other influences have promoted the transition of the forest in the Lower Wisconsin River Basin from oak-hickory dominated forest type to one composed of far more shade tolerant forest species, such as the sugar maple-white ash-basswood forest type. Today, the forest acreage in the maple-ash-basswood forest type is nearly 40% of the total forest acreage. Plantations comprise less than five percent (<5%) of the total forest acreage in the Lower Wisconsin River Basin (Amiel, 2000-2001).

Tree planting in the basin has helped restore some of the forested areas in the basin. Tree seedlings are available through the state nurseries and numerous private nurseries that serve Wisconsin. Annually, the landowners in the Lower Wisconsin River Basin plant in excess of 1,500,000 trees on approximately 2,200 acres. In recent years, there has been increased interest in direct seeding of hardwoods in open fields. In 1998, approximately 50 acres of direct seedling demonstration projects were established in the Lower Wisconsin River Basin to assist land resource managers in determining the merit and economic viability of direct seeding hardwoods into old fields (Amiel, 2000-2001, Schmidt, 1996).

Table 9: Forest Acreage By County* (1996)

<i>County</i>	<i>Forest Land (1,000 acres)</i>	<i>County</i>	<i>Forest Land (1,000 acres)</i>
Adams	253.1	Jackson	366.8
Columbia	98.0	Juneau	271.7
Crawford	184.4	Monroe	273.4
Dane	81.8	Richland	167.0
Grant	195.7	Sauk	195.2
Iowa	139.5	Vernon	225.5

**Forest acres for entire county, not portion solely within Lower Wisconsin River Basin*

Hardwoods of the Lower Wisconsin State Riverway: There are two major types of forest along the Lower Wisconsin State Riverway; bottomland hardwoods and upland hardwoods. Bottomland hardwoods, also know as floodplain forests or southern wet and wet-mesic forest, cover approximately 50,000 acres, stretch from Portage in Columbia County south and west to the confluence of the Wisconsin and Mississippi Rivers in Crawford and Grant Counties. These forests are the dominant forest type in the Riverway and are the most significant bottomland hardwood forest ecosystems found in Wisconsin. The floodplain forests are dominated by silver maple, river birch, swamp white oak, American elm, green and black ashes, cottonwood and black willow. Also present is the sycamore, a rare species of “special concern” in the state.

Upland hardwood forests are found on the hillsides and ridgetops and include the southern mesic (sugar maple, basswood, red oak and white ash), dry-mesic (white and red oaks, ironwood and basswood) and dry forest types (black and white oak, shagbark hickory, black cherry, black walnut, hackberry, burr oak and red maple) (Carlson, Date unknown).

The Baraboo Hills: The Baraboo Hills are one of the most significant hardwood forest associations in the United States. This hardwood forest has been recognized as national and internationally significant by the U.S. Department of Interior (Fishery and Wildlife Service), State of Wisconsin (WDNR), Sauk County, preservationist organizations (Nature Conservancy), and various other resource organizations. The Baraboo Hills forest is dominated by the oak-hickory forest type, with northern hardwoods (maple-ash-basswood) increasing in importance over time. The Baraboo Hills ecosystem encompasses approximately 144,000 acres, with nearly 80% forested at this time.

Oak Savanna

Oak savannas are characterized by open grassland interspersed with trees, typically oaks. Savannas, historically found in southern and western Wisconsin, were the gradation between the

great prairies and the eastern deciduous forests. The oak savanna ecosystem was thoroughly fragmented and nearly totally destroyed throughout its range by the early to mid-19th century. Oak savanna now shares equal billing with tallgrass prairie as the most threatened plant community in the Midwest (WDNR, 1995). Intact examples of oak savanna vegetation are now so rare that less than 500 acres are listed in the Wisconsin's Natural Heritage Inventory. This is less than 0.01% of the original 5.5 million acres in the state (Crossley, 2001).

Grassland/Prairie

Original land survey records of the 1830's indicate there were 3.1 million acres of treeless grassland in Wisconsin equaling 9% of the total land cover. Tallgrass prairie and related oak savanna are now the most decimated and threatened plant communities in the Midwest and in the world. Wisconsin has only 0.5% (13,000 acres) of its original grassland ecosystem remaining in a relatively intact condition and much of this remnant acreage has been degraded to some degree by livestock grazing or woody invasion. Over 80% (11,000 acres) of this remaining acreage is sedge meadow and the rest (2,000 acres) is native prairie (Crossley, 2001).

Rare, Threatened and Endangered Plants and Plant Communities

There are a variety of terrestrial plants and plant communities in the Lower Wisconsin River Basin that have been designated by the state of Wisconsin as threatened, endangered, or a species of concern. These elements are listed on the Wisconsin Natural Heritage Inventory (NHI). The Bureau of Endangered Resources maintains the NHI, established in 1985. The NHI is used to determine the existence and location of rare species, natural communities and natural features in Wisconsin, including endangered and threatened species and special species of concern. For a complete list of these species found in the basin, please see Appendix E (Bleser, 2001).

Threats to Major Plant Communities

Land ecosystems in the Lower Wisconsin River Basin face numerous threats to their health and stability. Many of the threats, such as the fragmentation of large blocks of ecosystems, and change in plant structure and composition are the result of the changing land use and expanding population in the basin. The population growth that many of the communities in the basin are experiencing is leading to a variety of other issues including urban sprawl and changing transportation corridors. One controversial issue involving transportation corridors and land use in the basin is the Highway 12 expansion. Highway 12 is a main transportation corridor in the basin. There is a need to expand the capacity and safety of the highway while protecting and preserving the Baraboo Range National Natural Landmark, the Ice Age National Scenic Trail, prime farmland and other important natural resources in the area. In addition, changes in the corridor will most likely lead to changing development patterns in the area that will need to be addressed. The various partners involved in the project, including the governor, Wisconsin DOT, the Federal Highway Administrative Coordinator, the WDNR, the Nature Conservancy, USFWS, the National Park Service and USEPA, have tried to develop a plan that will address these concerns. As a part of this agreement, they are considering the development of bike trails as a part of the expansion. Commitments have been made to protect the Baraboo Range National Natural Landmark, to preserve farmland and other natural resources, and to provide local planning assistance to communities that will be affected by the highway expansion (Anderson, 2002).

In addition to the threat from changing land use, development and ecosystem fragmentation, invasive species can further threaten the health of existing native plants and plant communities. Invasive species are both exotic species (not native to Wisconsin) and those species that are native to the state that have a tendency to take over a site in the absence of fire. Invasive species are able to establish themselves in a location in such a way that they can eventually displace other species in the area and reduce overall biodiversity and habitat.

Invasive species threaten Wisconsin's plant communities by reducing the diversity or abundance of native species; disrupting the ecological stability of aquatic and land ecosystems; hampering boating, swimming and other water recreation; and taking an economic toll on commercial, agricultural and aquacultural resources. In the Lower Wisconsin River Basin, several of these species threaten the integrity of natural areas (Brandt, Carlson, Exo, Howard, Ishmael, Kephart, Nielsen, Pyrek, Wojciak, Zine, 2001).

Table 10: Some Terrestrial Invasive and Non-native Invasive Species in the Basin

<i>Species</i>	<i>Type</i>	<i>Noted Problem Areas</i>
Asiatic honeysuckles	Non-native, Invasive	Wyalusing State Park
Autumn olive	Non-native, Invasive	
Black locust	Invasive	Upper portion of the LWSR
Buckthorn (common and glossy)	Non-native, Invasive	Dells Natural Area, Cassel Prairie and Mazomanie Units of the LWSR
Garlic mustard	Non-native, Invasive	Mirror Lake State Park, Wyalusing, and Tower Hill State Parks, Helena Unit of the LWSR, Devil's Lake State Park
Knapweed	Non-native, Invasive	
Multifloral rose	Non-native, Invasive	East part of basin
Prickly ash	Invasive	Floodplain forests, degraded savannas
Purple loosestrife	Non-native, Invasive	Mazomanie, Dunlap Creek, Upper Baraboo River Watershed
Red cedar	Invasive	Dry prairie remnants basin-wide
Reed canary grass	Non-native, Invasive	Basin-wide
Russian olive	Non-native, Invasive	

Forests: Overall Threats and Restoration or Management Potential

Forest health in the Lower Wisconsin River Basin is threatened on a variety of fronts, from poor management and fragmentation to disease and pests. Gypsy moth, an exotic insect pest of many hardwood and occasionally conifer tree species, was introduced into the United States in the mid-1800s. This insect pest continues to spread west from its original introduction in Massachusetts. Gypsy moth is now established and considered generally infested in many eastern counties of Wisconsin, including Columbia County. Male gypsy moths continue to be trapped in all of the counties within the Lower Wisconsin River Basin with higher trap catches in northern Iowa and southern Sauk Counties. The gypsy moth population will increase and become a threat to forest health as it becomes established in the Lower Wisconsin River Basin. Periodic outbreaks of high populations can cause stress and potential mortality to the oak resource and other preferred species in this basin. Dry sandy sites and ridge tops with shallow rocky soils will

be most at risk for defoliation. Silvicultural guidelines have been established to help reduce damage caused by this pest. Aerial treatment of gypsy moth with the bacterial insecticide "Btk" has been planned for numerous spots within this basin for the 2002 spray season to slow the spread of this pest (Cummings-Carlson, Guthmiller, 2002).

Annosum root rot, caused by the fungus, *Heterobasidion annosum*, is another threat to forest resources. The disease was first detected in Adams County in 1993 and since then has also been confirmed in Iowa, Richland and Sauk Counties. This disease attacks many species of conifers and occasionally hardwoods. Red and white pine are most at risk for becoming infected in Wisconsin. Infection occurs through air borne spores landing and germinating on fresh cut stumps or wounds to trees and spreads through grafted root systems. As the disease spreads to healthy trees a circle of tree mortality occurs. Management recommendations to minimize spread include treating stumps during thinnings with Sporax, timing thinning of trees in the coldest and driest part of winter, minimize felling and skidding wounds, destroy infested material, and favoring hardwoods within a diseased stand (Cummings-Carlson, Guthmiller, 2002).

Oak wilt, caused by the fungus, *Ceratocystis fagacearum*, has been present in the Lower Wisconsin River Basin for approximately 100 years. All species in the red oak group (northern red oak, pin oak and black oak) are susceptible to infection and mortality. White, bur and swamp white oak can become infected but can also survive an infection. This disease causes mortality of oak in scattered small groupings of trees throughout the basin. This disease is a continued threat to the health of the basin's oak resource. The wounding of oak should be minimized, especially from April 15 to July 1 to limit overland infections (Cummings-Carlson, Guthmiller, 2002).

Red pine plantations between the ages of 30 - 45 are often afflicted with red pine pocket decline, a syndrome caused by a complex of several insects and a fungus. This syndrome typically starts by killing a small number of trees but gradually expands in concentric circles, killing a few more trees each year. This complex typically involves pine engraver beetles (*Ips. pini*), red turpentine beetle (*Dendroctonus valens*), root collar weevil (*Hylobius radialis*), and the fungus *Leptographium spp.* Red pine pocket decline is expected to continue to kill red pine in this basin. Management strategies to minimize mortality are currently being studied (Cummings-Carlson, Guthmiller, 2002).

Despite all of these threats to forest resources, perhaps one of the largest threats to forest ecosystems in the basin is the continued fragmentation of forests. The percentage of forested area for various southern counties ranges from almost zero in some eastern counties to 30% or 35% in the western coulee region and the average size of a southern Wisconsin woodlot is currently 47 acres. Other management issues associated with southern forests include the difficulty in using fire to maintain oak forests, the spread of oak wilt and the problem of non-native shrubs and herbs becoming dominant on some sites (Crossley, 2001).

There are many small-scale opportunities for forest management on private lands scattered throughout the basin. Several of the top locations in the Lower Wisconsin River Basin for landscape scale southern forest management opportunities are listed in Table 11 (Crossley, 2001, Henderson and Krause, 1995; Nature Conservancy, The, 2001).

Some forest management and restoration tools include; 1) reducing the fragmentation of woodlots by enlarging current blocks and providing corridors through reforestation; 2) maintenance of mixed oak and oak-hickory forest by appropriate silvicultural methods, including prescribed burning; and 3) fencing of overgrazed woodlots where objectives include the restoration of understory grasses, herbs, and shrubs for foliage gleaning foragers (Crossley, 2001). In the future, wood and forestry cooperatives have the potential to impact forest management and restoration in the basin and throughout the State of Wisconsin. For more information on state forestry programs like Urban and Community Forestry Assistance, Managed Forest Law, Forest Fire Management and Forestry Cost-Sharing Programs, see Chapter Five: Natural Resources Management Programs.



Floodplain Forest. Baraboo River, Columbia Co. Photo Courtesy of E.J. Epstein and WDNR.

Table 11: Best Opportunities to Manage and Restore Forests in the Basin

<i>Region/Focus Area</i>	<i>County</i>	<i>Watershed</i>
Baraboo Hills ♦ <i>Lost Lake State Natural Area</i> ♦ <i>McGilvra's Woods State Natural Area</i> ♦ <i>Pewits Nest State Natural Area</i> ♦ <i>Devil's Lake State Park</i> ♦ <i>Natural Bridge State Park</i> ♦ <i>Parfrey's Glen</i> ♦ <i>Potter Preserve</i> ♦ <i>Ableman's Gorge State Natural Area</i> ♦ <i>Van Zelst's Barrens</i> ♦ <i>Ice Age Park and Trail Foundation Lower Narrows</i> ♦ <i>Baxter's Hollow</i> ♦ <i>Durst Rockshelter</i> ♦ <i>Hemlock Draw</i> ♦ <i>Honey Creek</i> ♦ <i>Leopold Memorial Woods</i> ♦ <i>Morgan-Hone</i> ♦ <i>Pan Hollow</i> ♦ <i>Pine Hollow</i> ♦ <i>South Bluff Oak Forest</i>	Sauk and Columbia Counties	Various
Lower Kickapoo River Valley ♦ <i>Kickapoo Wildlife Area – Wauzeka Unit</i> ♦ <i>Wauzeka Bottoms State Natural Area</i>	Crawford County	LW01; LW02
Woodman/Wyalusing Bluffs ♦ <i>Wyalusing State Park</i> ♦ <i>Woodman Unit – Lower WI State Riverway</i>	Grant and Crawford	LW01; LW07
Middle Wisconsin River, including the Dells	Sauk and Columbia	Various
Hub City Bog	Richland County	LW13
Pine River Cliffs	Richland County	LW13
Snow Bottom	Grant County	LW09

Oak Savanna: Overall Threats and Restoration or Management Potential

The flora and fauna found in oak savannas, including the oaks, are threatened by the increasing abandonment of lightly to moderately grazed wooded pastures and the accelerating succession of oak woodlots toward heavy-shade-producing trees and shrubs and fragmentation of existing oak savannas.

There are many private land opportunities for small-scale savanna and barren restoration scattered throughout the basin. Many of the retrievable acres are overgrazed or overgrown oak savanna. Much of this land, especially low productivity sites, could be restored within a decade simply by tree thinning, brushing and burning. Some plant reintroduction may be necessary, but much can be accomplished with fire alone. Light grazing may also have potential as a savanna management tool and as a means of maintaining the open habitat required by many savanna vertebrates. There are several restoration opportunities identified at the landscape scale (Table 12). (Crossley, 2001; Henderson and Krause, 1995; Nature Conservancy, 2001; Sample and Mossman, 1997).

Table 12: Best Opportunities for Savanna Restoration or Management in the Basin

<i>Region/Focus Area</i>	<i>County</i>	<i>Watershed</i>
Pine Island Area Grasslands ♦ <i>Pine Island Wildlife Area</i>	Columbia	LW21
Rocky Run State Fisheries Area ♦ <i>Rocky Run Oak Savanna State Natural Area</i>	Columbia	LW20
Badger Army Ammunition	Sauk	LW19
Mirror Lake Barrens ♦ <i>Van Zeist Barrens</i> ♦ <i>Mirror Lake State Park</i>	Sauk	LW26
Governor Dodge State Park	Iowa	LW15
Lower Wisconsin River Prairies and Barrens <i>Spring Green Reserve State Natural Area</i> <i>Gotham Jack Pine Barrens State Natural Area</i> <i>Avoca Prairie-Savanna State Natural Area</i> ♦ <i>Blue River Sand Barrens State Natural Area</i>	Various	Various

Grassland and Prairie: Overall Threats and Restoration or Management Potential

Most grassland has suffered one of the following fates: 1) conversion to crop production; 2) over-grazing; or 3) invasion by shrubs and trees due to lack of fire, lack of grazing, or both. There are many private land opportunities for small-scale grassland and prairie restoration scattered throughout the basin. Managed use of fire, removal of trees and shrubs, light grazing, control of non-natives, and prairie plantings will aid these restoration efforts although restoration efforts will not be feasible for all grassland birds, plants and invertebrates. There are restoration opportunities identified at the landscape scale (Table 13) (Crossley, 2001; Henderson and Krause, 1995; Nature Conservancy, The, 2001; Sample and Mossman, 1997).

Table 13: Best Opportunities to Manage or Restore Prairie/Grassland in the Basin

<i>Region/Focus Area</i>	<i>County</i>	<i>Watershed</i>
Pine Island Area Grasslands ♦ <i>Pine Island Wildlife Area</i>	Columbia County	LW21
Mud Lake Wildlife Area	Columbia County	LW20
Badger Army Ammunition Plant	Sauk County	LW19
Black Earth Prairie	Dane County	LW17
Hawk Hill	Dane County	LW19
Lower Wisconsin River Prairies and Barrens ♦ <i>Spring Green Reserve State Natural Area</i> ♦ <i>Avoca Prairie-Savanna State Natural Area</i> ♦ <i>Blue River Sand Barrens State Natural Area</i>	Various	Various

Projects to Conserve and Enhance Land Resources***Land Legacy Study: Conserving Resources and Providing Recreation***

The WDNR, in cooperation with all citizens of the state, is conducting a study of places that will be important in meeting conservation and recreation needs for the next fifty years. The Natural Resources Board (NRB) authorized this study, called the Land Legacy Study, in 1999. The purpose of the study is to identify what lands and waters will be critical for conserving our

plants, animals, and their habitats and what places will be important in providing outdoor recreation. The outcome of this study will help to better understand land protection needs and priorities.

Any areas identified in this study that appear suitable for the WDNR to offer to purchase will go through the WDNR's standard evaluation process. That process is designed to assess interest and support for public land ownership within a particular area. If there is public support, including the support of local landowners, the process also recommends property boundaries to accomplish specific conservation and recreation objectives. The WDNR purchases land from willing sellers only and the WDNR can only purchase land within areas that have been approved by the NRB and the Governor.

The Land Legacy Study identifies the areas of significance throughout the state. These areas of significance are divided up into two categories – a Legacy designation means that the resource is “significant” on a statewide, Midwest or national basis while a Registry designation determines the locations to be “significant” on a local scale. There are several areas of significance located in the Lower Wisconsin River Basin (Table 14).

Table 14: Areas in the Lower Wisconsin River Basin identified by the Land Legacy Study

<i>Area of Significance</i>	<i>Reason for Significance</i>	<i>Designation</i>
Baraboo Hills	Large upland forest, high species diversity, unique features, grassland restoration potential	Legacy
Big Green/Little Green Rivers	High quality Class I trout streams	Registry
Blue River Bluffs	One of the largest sand prairies	Registry
Lewiston Marsh	Good quality tamarack marsh	Registry
Mill Creek Corridor/Marshall Erdman Property	Scenic and productive spring creeks	Registry
Mississippi River Floodplain and Terraces	Sandy, undeveloped terraces important to migratory birds as well as reptiles and amphibians	Registry
Pine River and Cliffs	Good water quality, including a brood stream, and a variety of natural features	Registry
Willow Creek & Cliffs/Bear Creek	Unique spring creek and a variety of other natural features	Registry

Want to know more about the Land Legacy Study?

http://www.dnr.state.wi.us/master_planning/land_legacy/index.html

The Nature Conservancy and the Prairie-Forest Border Ecoregion Conservation Plan

The Prairie-Forest Border Ecoregion is the transition zone, or “meeting place” between the tallgrass prairies and the northern forests. The ecoregion covers parts of Wisconsin, Illinois, Iowa and Minnesota. In Wisconsin, the Prairie-Forest Border Ecoregion covers nearly the entire bottom half of the state, including the Lower Wisconsin River Basin. The ecoregion contains significant vegetative communities and habitats including oak savannas, prairies, and algific talus slopes and is home for a variety of plant and animal species that are only found in this portion of the world - many of which are also listed on the federal endangered or threatened list.

Due to the ecological significance of the Prairie-Forest Border Ecoregion as habitat for plants, plant communities and animals, it is imperative that it be protected to ensure the maintenance of the rare and special species found there. To do this, a group of conservation organizations and partners spent two years developing a plan to manage, restore and protect the ecoregion. The planning group consisted of representatives from Wisconsin, Illinois, Iowa, and Minnesota DNR’s and state chapters of The Nature Conservancy, Minnesota Heritage, Southeast Regional Planning Commission (WI), and the USFWS, including a representative from the Necedah National Wildlife Refuge.

The group decided to target Ecologically Significant Areas and restoration areas in the ecoregion. By choosing some of the best natural communities in the area, they will be able to conserve the most acreage and greatest number of species. The conservation goals set by the group are intended to ensure the survival of and enhance the restoration of many of the native species and communities in the Prairie-Forest Border Ecoregion. (Nature Conservancy, The, 2001).

Conservation Reserve Enhancement Program (CREP)

This program provides landowners the opportunity to voluntarily enroll agricultural land in conservation practices. The conservation practices include filter strips, riparian forest buffers, small wetland restoration and grassed waterways. The goal of the program is to protect environmentally sensitive land, increase wildlife habitat and protect streams, lakes and rivers by reducing runoff and erosion. For more information on the economic incentives offered to landowners, Chapter Five: Natural Resources Management Programs.

WILDLIFE RESOURCES

White-tailed deer

The overwinter population estimates for deer in the basin in the winter of 2000-2001 varied between 24-50 deer/square mile of deer range. The overwinter goal varies by unit from 20-30 deer/square mile of deer range. The basin crosses into parts of nine Deer Management Units (54B, 70, 70A, 70B, 70E, 71, 73D, 73E, and 74B). Special seasons (such as Zone T and Earn-a-Buck seasons) have been common place in the basins since 1996 as biologists struggle to bring units to goal. Deer management in urban areas, where hunting might not be an option and citizens’ viewpoints are diverse, has become one of the more controversial wildlife management problems (Crossley, 2001).

Chronic Wasting Disease (CWD), a nervous system disease of deer and elk, has been found in deer in the Mount Horeb area. The disease is a neurological disease found only in elk and deer and leads to malfunction of the animal's neurological system. CWD poses a significant management challenge to wildlife biologists as they struggle to try to limit the movement of the disease through the deer herd in the other portions of the basin and the entire state.

Wild Turkey

Seven turkey management zones (2, 3, 4, 5, 10, 15 and 16) cover all or part of the basin. Wild turkeys are one of the "success" stories of southwestern Wisconsin wildlife. Wisconsin's native population of eastern wild turkeys was extirpated in the late 1800's, but the restoration attempt that began in 1976 with the release of 45 wild-trapped turkeys from Missouri was a dramatic success. Turkeys need a relatively small range and are very adaptable. They were originally found in association with oak savannas but have adapted to use mature hardwood forests, specifically oak, which is interspersed with openings, both agricultural and non-agricultural. Threats to turkey habitat include expanding residential development and lack of adequate oak regeneration. Active silviculture and appropriate use of prescribed burning can provide some restoration and management opportunities to improve turkey habitat (Crossley, 2001).

Ruffed Grouse

Although not in the core of Wisconsin's prime ruffed grouse country, the Lower Wisconsin River Basin still offers some good ruffed grouse hunting opportunities. Good year-round grouse habitat contains a mixture of young and old hardwood forests with thick underbrush. The oak forests of the basin provide an abundance of grouse management opportunities in the oak forests of the Basin. The long-term challenge to ruffed grouse management is maintenance of the oak-hickory forest in the face of succession to northern hardwoods on the area's rich heavy soils (Crossley, 2001).

Ring-Necked Pheasant

The Lower Wisconsin River Basin lies outside of the heart of the traditional pheasant range in Wisconsin. However recent efforts to relocate pheasants to the area has met with some success and there is growing interest in pheasants and pheasant hunting in the basin. Although not native to the area, pheasants have filled the void left by the absence of other upland bird species such as the sharp-tailed grouse and prairie chicken. They nest in grasslands and often winter in bottomland wetlands, native grass fields and cattail stands (Crossley, 2001).

Waterfowl

Waterfowl populations and habitat in the Lower Wisconsin River Basin are primarily restricted to bottomlands along rivers and streams. A variety of waterfowl use the wetland complexes along the Wisconsin River and other scattered riparian wetlands in the basin. Mallards, black ducks, blue-winged and green-winged teal, hooded mergansers, and giant Canada geese are common nesters along the Mississippi River. All waterfowl common to the central U.S. use the river during spring and fall migration with canvasbacks being the species of greatest interest because of their tenuous national status (Crossley, 2001).

Wisconsin's portion of the Upper Mississippi River Great Lakes Region Joint Venture plan identifies the Lower Wisconsin River and the Kickapoo River as particularly significant riverine

and bottomland habitat (WDNR, 1992). Habitat management opportunities are limited to protecting and managing bottomland timber, implementing waterfowl management objectives outlined in master plans along the Lower Wisconsin State Riverway, and encouraging good soil and water conservation practices on uplands adjacent to water courses. Management efforts will emphasize wood duck production and habitat protection. Upland cover management for dabbling ducks and other grassland species will be a priority (Crossley, 2001).

Grassland Birds

Grassland-dependent birds have experienced a precipitous population decline. Between 1966 and 1994 the populations of ten grassland bird species declined significantly in Wisconsin according to the Federal Breeding Bird Survey (BBS) (United States Geologic Service, 2000). These declines were not only evident in Wisconsin, but throughout the Midwest and the continent as a whole (Crossley, 2001; Sample and Mossman 1997).

The main reason for this decline has been the loss of native grasslands and a change in agricultural land use from wheat farming in the late 1800s, to dairying in the mid-1900s, to the growth of row cropping in recent decades (Sample, 1989). Row cropping has decreased useable habitat for grassland birds and much late-harvested grass hay has also been converted to alfalfa, which is harvested early and frequently, causing significant mortality of nesting birds who use these crop fields as surrogate grassland habitat (Crossley, 2001; Frawley, 1989; Graber and Graber, 1963).

Forest Interior Birds

While only the passenger pigeon (extinct), carolina parakeet (extinct) and swallow-tailed kite (extirpated) have been lost from the southern forest landscape, many species have been negatively impacted by habitat loss, reduced size of habitat area, and changes in the composition and structure of forests and woodlots (WDNR, 1995). These changes have affected bird distribution and abundance to the point where many species are listed as endangered, threatened, or of special concern, and others show significant population declines (Bond, 1957, Crossley, 2001).

Studies have found that there are at least 12 songbirds that depend on forests in excess of 40 acres in size, with three requiring a minimum of 161 acres and five more requiring at least 200-acre woodlots to have at least a 50% chance of supporting a breeding population (Temple, 1988). However, the average size of a southern Wisconsin woodlot is currently 47 acres (WDNR, 1995). These small, fragmented woodlots also create significant challenges to birds trying to successfully nest because nest predation increases with fragmentation. These fragmented habitats make it easier for cowbirds to parasitize nests and for mammalian and avian nest predators to locate nests (Crossley, 2001).

Rare, Threatened and Endangered Species

There are a variety of animals and insects in the Lower Wisconsin River Basin that have been designated by the state of Wisconsin as threatened, endangered, or a species of concern. These elements are listed on the Wisconsin Natural Heritage Inventory (NHI). The Bureau of Endangered Resources maintains the NHI, established in 1985. The NHI is used to determine the existence and location of rare species, natural communities and natural features in Wisconsin,

including endangered and threatened species and special species of concern. For a complete list of these species found throughout the basin, please see Appendix E (Bleser, 2001).

Threats to Wildlife Resources

Habitat loss and fragmentation are the main threats to wildlife in the Lower Wisconsin River Basin. Habitat continues to be degraded, simplified, fragmented or destroyed by some land and water use practices, policies and development decisions. The basin's fish and wildlife, our continued enjoyment of hunting and fishing, our tourism industry and our quality of life depend on high quality natural habitat.

There are a variety of things that can happen to wildlife as a result of urban sprawl and the fragmentation of the rural landscape. Wildlife species that are generalists or well-adapted to humans, such as deer, coyotes, red-winged blackbirds, or robins can do fine in the urbanizing landscapes. But species that are specialists or need larger blocks of land such as upland sandpipers, dickcissels, harriers, and western meadowlarks, will not do well in the fragmented landscape being created by scattered development (Crossley, 2001).

Urban sprawl and fragmentation are also making it increasingly difficult to manage huntable species, particularly deer. As 200-acre farms that allowed hunting are broken up, they are being developed by people who don't hunt and/or don't allow hunting. Safety concerns and discharge of firearms issues also come in to play as development becomes more dense. Increased traffic as a result of increased development can result in more vehicle-wildlife collisions. Larger animal population can increase damage on neighboring farms where deer are not hunted. Landowners in the country can also see increased damages to gardens and ornamentals (Crossley, 2001).

Participation in fishing and hunting has not kept pace with the state's population growth. Hunters and anglers are the primary supporters of the WDNR's fish and wildlife conservation programs. Declining participation threatens the ongoing protection of these resources and perhaps even the long-term viability of these recreational activities (Crossley, 2001).

Wildlife Surveys

Several wildlife surveys have been conducted in areas in the Lower Wisconsin River Basin to examine the composition and range of wildlife in the basin. Some of these surveys, discussed below, have been conducted as a part of a larger state or national effort. To see the results of these surveys, please see Appendix I (Crossley, 2001).

Federal Breeding Bird Survey

The Federal Breeding Bird Survey (BBS), started in 1966, is a survey organized by the Fish and Wildlife Service and conducted by volunteers who survey specific routes throughout the state. There are four routes in the Lower Wisconsin River Basin (Routes 52, 55, 316 and 317). A composite list of breeding birds identified on these routes is probably the best (albeit incomplete) reflection of breeding birds found in this basin. Of the 120 species observed on these routes, one species is state endangered, five are state threatened, and 24 are species of Special Concern (Crossley, 2001, United States Geologic Survey, 2000).

For more information on the BBS
<http://www.mbr.nbs.gov/bbs/bbs.html>

Wisconsin Herpetological Atlas

The Wisconsin Herpetological Atlas project, (Herp Atlas), is an effort coordinated by the Milwaukee Public Museum to document the presence or absence of all species of reptiles and amphibians in Wisconsin on a county-by-county basis. The basin contains 5 of Wisconsin's 7 species of salamanders, 11 of the 12 frog and toad species, all of the 11 species of turtles, 3 of the 4 lizards, and 18 of the 19 species of snakes (Crossley, 2001).

For more information on the Herp Atlas
<http://www.mpm.edu/collect/vertzo/herp/atlas/atlas.html>

The Wisconsin Frog and Toad Survey

The Wisconsin Frog and Toad survey was initiated in 1981 by the WDNR to help determine the status and population trends of Wisconsin's 12 species of frogs and toads. Survey data are collected annually by cooperators who note the distinctive calls of each species along permanent roadside routes. It serves as an index to the relative abundance of frogs and toads throughout the state. Amphibians are particularly susceptible to environmental changes. As a result, these surveys can be very valuable for showing the impacts of land use changes.

There are 10 survey routes in the Lower Wisconsin River Basin (Route numbers 111, 115, 121, 135, 139, 251, 252, 531, 532 and 571). A look at population trends from 1984-1999 for all the surveys run in the Driftless Area Ecoregion (which includes the Lower Wisconsin River Basin) shows that of the 11 species found in the basin, only the Pickerel Frog is exhibiting a statistically significant population decline. Six of the 11 species have exhibited a stable population since 1984 and four species have exhibited an increasing population trend during that time (Crossley, 2001, Mossman, et al., 1998).

For more information on the survey
<http://www.mbr.nbs.gov/wifrog/wfts.htm>

PUBLIC LAND AND RECREATION IN THE LOWER WISCONSIN RIVER BASIN

There is a wide-range of recreational opportunities available in the Lower Wisconsin River Basin. These recreational opportunities rely on healthy land, water and air resources. Without protection of the various natural resources in the basin, many of these recreational opportunities would not be available. Public lands range from federally owned, to state, county, city and township owned. Many of the recreationally activities that citizens can enjoy range from fishing, boating, canoeing and swimming, to hiking, skiing, biking, birdwatching, and picnicking. There are several types of state owned land including:

State Parks provide areas for public recreation and education in conservation and nature study. Hiking, camping, picnicking, swimming, fishing, boating, cross country skiing and bird watching are common activities.

State Trails provide areas for public recreation and transportation. State Trails can be classified as either State Parks or State Recreation Areas. Most State Trails are bicycle and hiking trails. Types of use are managed to avoid conflicts and provide a quality recreation experience.

State Recreation Areas are lands and waters that are environmentally adaptable to multiple recreational uses or preservation. Like State Parks, these areas provide outdoor-based public

recreation, conservation education and nature study. Types of use are managed to avoid conflicts and provide a quality recreation experience.

State Natural Areas generally have escaped environmental disturbance so that recovery of natural conditions can occur. They provide a reserve for native biotic communities and frequently provide habitat for endangered threatened or critical species. Natural Areas also may include significant geological or archaeological features.

The Ice Age National Scientific Reserve is administered by the state in cooperation with the National Park Service. These areas preserve significant geological features left by the last glacier that shaped Wisconsin's landscape. They have educational and scientific value and provide outdoor based recreation. The Ice Age National Scenic Trail is an example of this program within the Lower Wisconsin River Basin. The WDNR cooperates with the *Ice Age Park and Trail Foundation* in administering the Ice Age National Scenic Trail program.

Want to know more about the Ice Age Trail?
<http://www.iceagetrail.org/>

Map 13: Ice Age National Scenic Trail



Ice Age Trail in Wisconsin

Graphic courtesy of the Ice Age Park & Trail Foundation,
Drew Hanson, Ice Age Trail Geographer

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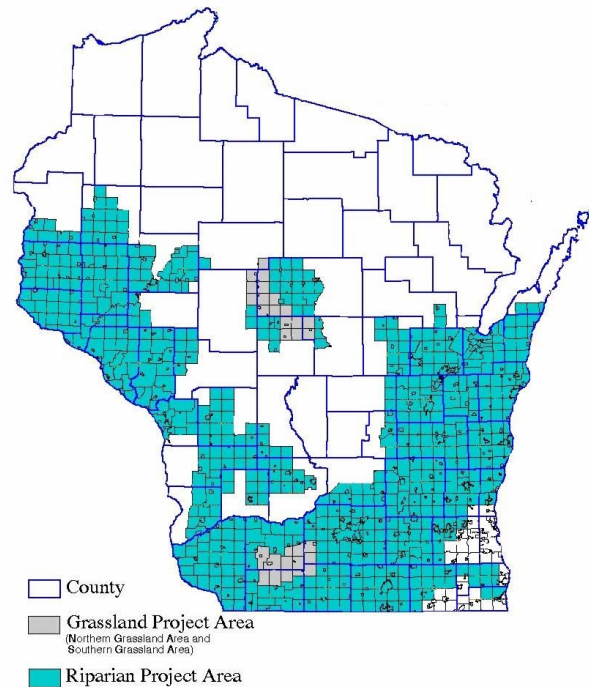
CHAPTER 5: NATURAL RESOURCES MANAGEMENT PROGRAMS

CONSERVATION RESERVE ENHANCEMENT PROGRAM

The Conservation Reserve Enhancement Program, or CREP, is now available. Residents who live in the shaded townships on Map 14 are able to enroll eligible agricultural lands that are within 150 feet of an eligible water body into conservation practices through a 15-year contract or a permanent easement. This voluntary program is a partnership between landowners and FSA, DATCP, NRCS, WDNR, and LCD.

By voluntarily enrolling in the program, the landowner is eligible for a variety of benefits including:

- ◆ Annual rental rates from \$35 to \$125 an acre, depending on the soil type
- ◆ Annual federal incentive payments from 35%-60% of the annual rental rate, depending on the practices installed
- ◆ Annual maintenance payment of \$5-\$10 per acre per year, depending on practices installed
- ◆ One-time federal signing incentive payment
- ◆ One-time state incentive payment
- ◆ Up to 110% cost-sharing for installation of the practices



Map 14: Townships Eligible for CREP

Eligible practices through CREP include filter strips, riparian forest buffers, small wetland restoration, and grassed waterways. The conservation practices installed through CREP will improve water quality and fisheries, as well as increase wildlife habitat in the watershed. Enrollment in CREP is made on a first-come, first-served basis. To find out more, contact the Farm Service Agency.

DRINKING WATER AND GROUNDWATER PROGRAMS

The Drinking Water and Groundwater Program enforces several state statutes and state administrative codes, many of which are mandated by the federal Safe Drinking Water Act (SDWA). The WDNR, DATCP, DOT and COM (Department of Commerce) share enforcement responsibilities for state groundwater standards.

Want to know more about drinking water and groundwater?

<http://www.dnr.state.wi.us/org/water/dwg/>

Private Water Supply

The WDNR regulates the construction of private water wells and pump installations, ranging from low capacity wells serving private homes and small businesses to high capacity wells for crop irrigation or serving large industries. Well drillers and pump installers are licensed, and WDNR field staffs perform inspections to insure that they comply with WDNR codes. Well water complaints may be investigated by WDNR if there is evidence to suggest health-threatening contamination. If contaminants exceed state groundwater standards, a health advisory letter to the well owner will recommend actions to obtain a safe source of drinking water. The ***Well Compensation Grant Program*** provides financial assistance to replace or treat private wells that deliver water that contains chemical concentrations exceeding state or federal drinking water standards. There are certain homeowner eligibility requirements.

Public Water Supply

The WDNR regulates the construction and operation of wells and water systems for municipalities, sanitary districts and smaller communities such as mobile home parks and residential subdivisions. Schools, restaurants, daycare centers, factories, motels, churches, parks and wayside wells are also regulated by the WDNR. These systems are inspected and sampled regularly for compliance with safe drinking water standards. When a water supply system fails to meet compliance standards, the public is informed, and the problem is corrected. The State Drinking Water Revolving Loan Fund assists communities with construction of improvements to eliminate drinking water contamination. Other related programs include the ***Capacity Development Program*** and the ***Wellhead Protection Program***.

DAM SAFETY, FLOODPLAIN, AND SHORELINE MANAGEMENT PROGRAM

Dam Safety Program

The Dam Safety Program, Chapter 31 of Wisconsin's State Statutes, was developed to ensure that dams are safely built, operated and maintained. Since the 1986 Dam Safety Inspection Act, the WDNR is required to inspect large dams on navigable waterways once every 10 years. Large dams are defined as having a structural height of over 6 feet and impounding more than 50 acre-feet or having a structural height of over 25 feet and impounding more than 15 acre-feet. Dams that are federally owned or regulated are exempt from state inspections.

Want to know more about dams and floodplains?

<http://www.dnr.state.wi.us/org/water/wm/dsfm/>
<http://www.ferc.fed.us/>

Since 1986, funding for dam repairs and modifications has been available to eligible communities through a ***Dam Grant Program***. Communities facing repair or modification or removal of their dam can apply for partial coverage of the costs.

For more information,

<http://www.dnr.state.wi.us/org/water/wm/dsfm/dams/grants.html>

Hydropower Re-Licensing and Compliance Monitoring Program

Most dams in the United States that are used for energy production or “hydropower” are regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act.

FERC is the primary regulatory agency responsible for issuing new licenses, monitoring compliance with existing licenses and conducting dam safety inspections on hydropower projects in the United States. Over time, resource agencies and the general public became concerned that operating conditions under existing licenses were having adverse impacts on aquatic habitat and organisms and recreational use opportunities.

In 1986, Congress passed the Electric Consumers Protection Act (ECPA), requiring that the FERC consider power and non-power values and interests equally. As a result, FERC developed a detailed five-year consultation process between hydropower owners, resource agencies and the general public when existing facilities came up for re-licensing. Since then, the WDNR has been participating in licensing activities on all new and re-licensed projects. As a result, many stakeholders have formed settlement groups to address the new regulatory requirements placed on hydropower operators and owners, resource agencies and the general public to ensure that all affected parties concur with the terms and conditions of the new operational license.

Floodplain Management Program

Counties, cities and villages are required to administer floodplain zoning regulations, to insure that new development is protected from flooding. The goals of the floodplain management program are to prevent flooding and flood-blighted areas, to minimize the costs of flood control projects, reduce tax dollars spent on flood relief, and to protect life, health and property. As a part of this program, is the Flood Hazard Mitigation program (FHM). The FHM is a voluntary program that assists communities in developing plans to reduce or eliminate future flood losses by removing older floodplain structures, flood proofing and elevating others. Communities must have a FHM Plan to be eligible for future flood disaster aid.

Shoreland Management Program

Wisconsin's Shoreland Management Program is a partnership between state and local government that requires the adoption of county shoreland zoning ordinances to regulate development near navigable lakes and streams, in compliance with statewide minimum standards. These minimum statewide standards, found in chapter NR115, Wisconsin Administrative Code, seek to create a balance between private rights and public responsibilities of landowners.

LAND MANAGEMENT PROGRAMS

Facilities and Lands

The Wisconsin Land Management Program manages and operates the WDNR's land, easements, and leases. The WDNR is given the authority to acquire land for various conservation projects through legislation and state statutes. Within approved project areas, property managers contact landowners that are willing to sell their property. The program also provides support for land acquisition, facility design and planning services. The land programs engineering staff design and write contracts for WDNR projects. Land Services also assists with feasibility studies to establish new lands projects, master planning, site planning and design.

Want to know more about facilities and lands?
<http://www.dnr.state.wi.us/org/land/facilities/>

State Public Lands Management Programs

The State Parks and Trails Program protects unique and significant natural resources while, at the same time, providing compatible recreation opportunities. An area may qualify to become a state park or trail by reason of its scenery, its plants and wildlife, transportation capability (state trail) or its historical, archaeological or geological qualities. Natural Areas have educational or scientific value, or are important as a reservoir of the state's genetic or biologic diversity.

Want to know more about state lands?

<http://www.dnr.state.wi.us/org/land/parks/>

<http://www.dnr.state.wi.us/org/land/er/snas.htm>

<http://www.dnr.state.wi.us/org/at/et/geo/iceage/index.htm#>

Many county and municipal departments, conservation, civic, and youth organizations, non-profit "Friends" groups and private volunteers participate in the operations, development and management of the State Parks and Trails program.

WILDLIFE MANAGEMENT PROGRAMS

The Bureau of Wildlife Management oversees a complex web of programs that incorporate state, federal and local initiatives primarily directed toward wildlife protection, habitat management and enhancement. Programs include land acquisition, development and maintenance of State Wildlife Areas, and other wild land programs such as State Natural Areas.

The WDNR works with local government staff to integrate wildlife management with county-based agricultural services provided by the Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS) and provides landowners with technical advice and information and education on wildlife and habitat management. Some state and federal cost share programs provide incentives to improve habitat on privately owned lands. Another wildlife related program is the Wildlife Damage Abatement and Claims Program (WDACP).

Want to know more about wildlife programs?

<http://www.dnr.state.wi.us/org/land/wildlife/>

FORESTRY PROGRAMS

The WDNR's Strategic Plan for Forestry identifies important forestry issues, and guides programmatic efforts towards addressing these issues through integrated planning and management. The Division of Forestry recently completed an assessment of the Wisconsin forests (Wisconsin Forests at the Millennium-An Assessment November 2000) and will begin work on development of a Statewide Forest Plan.

Want to know more about forestry programs?

<http://www.dnr.state.wi.us/org/land/forestry/>

<http://www.wisconsincountyforests.com/index.html>

<http://www.dnr.state.wi.us/org/land/forestry/usesof/bmp/bmptoc.htm>

Forestry in the Lower Wisconsin River Basin relies upon the partnering between a variety of diverse groups including:

- WDNR
- FSA
- LCDs
- Landowners
- Turkey Federation
- Nature Conservancy
- USDA
- NRSC
- UW-Extension
- Wisconsin Woodlands Owners Association (WWOA)
- Co-op Consulting Foresters
- Walnut Council
- Others interested in forest stewardship
- America Forest Institute (Tree Farm Family)

The County Forest Program is a long-standing county/state partnership provides technical assistance to county forests, and interest-free loans and grants to county forest programs. The WDNR also assists private, non-industrial landowners and private cooperating foresters, agencies and groups to better care for their forestlands.

Urban and Community Forestry Assistance Program

The Urban and Community Forestry Assistance Program enables and encourages sound management of Wisconsin's urban forest ecosystems. The Urban Forester works with communities of all sizes, "green" industry professionals, businesses, schools, non-profit organizations and the public to provide technical assistance, education and training and resource development.

Managed Forest Law (MFL) Program

The Managed Forest Law (MFL) program was developed in 1985 by the Wisconsin Legislature. The MFL program is the combining of the Forest Crop Law (FCL) (1927) and the Woodland Tax Law (WTL)(1954) programs into a single forest stewardship program. The purpose of the MFL program is to encourage the growth of future forest through sound forestry practices while recognizing the individual property owners' objectives and society's needs for compatible forest recreation, aesthetics, wildlife, erosion control, and protection of endangered resources

The MFL program has in excess of 30,000 landowners statewide, with over 3.0 million acres of forest in the program. Forest lands in the MFL program must have a written forest stewardship plan approved by local WDNR forester, 10 or more acres of woodlands, and a 25 or 50 year contract. The landowners can "close" up to 80 acres of MFL acres to public access. Forest acreage in the MFL program that exceeds 80 acres of woodlands in MFL per township must be left open to public access. "Open" MFL acres have a tax rate of \$.74 per acre per year. "Closed" MFL acres are taxed at a rate of \$1.74 per acre per year. Besides the annual acreage fee, a 5% yield tax is assessed on all commercial forest products harvested from the MFL acreage.

Table 15: Acres of Woodlots Enrolled in the MFL Program in Counties in the Lower Wisconsin River Basin as of January 1, 2000*

<i>County</i>	<i>Acres in MFL</i>	<i>Acres in FCL</i>	<i>County</i>	<i>Acres in MFL</i>	<i>Acres in FCL</i>
Adams	81,733	3,159	Juneau	34,996	2,533
Columbia	10,764	443	Monroe	20,537	2,776
Crawford	20,607	1,167	Richland	38,524	607
Dane	14,303	281	Sauk	20,657	990
Grant	11,695	970	Vernon	29,227	1,765
Iowa	31,689	478	BASIN TOTAL	314,731	15,169

*Information from Carol Nielsen, WDNR..

Forest Fire Management

The WDNR is statutorily mandated to provide for forest fire control within the Lower Wisconsin River Basin on lands outside incorporated city or village limits. Activities include; fire prevention education, detection, pre-suppression activities, fire suppression activities and law enforcement.

Of the 3,231,987 acres within the basin, 1,120,000 acres are directly protected by a joint partnership involving WDNR manpower and equipment and the cooperative services of 62 local fire departments. A volunteer staff of 219 local Emergency Fire Wardens is also maintained.

Want to know more about forest fire management?
<http://www.dnr.state.wi.us/org/land/forestry/fire/>

In an average year (1974-1998), 201 fires burn over 660 acres. Human activities are the primary source of ignition, with 36% of these forest fires resulting from careless debris burning.

Forestry Cost-Sharing and Incentive Programs

EQIP and the **CRP** are the two federal programs that have the greatest impact on forestry. Both are designed to address the needs of the lands and to reduce the long-term erosion from agricultural activities. Tree planting is the single largest forestry component of these two cost-sharing programs. The use of the state nursery stock, state and county tree planters, plus the customer tree planters and custom herbicide applicators all have an impact on the local landscape and economy. A new initiative, **CREP**, has been established as a part of the CRP program. CREP provides landowners with economic incentives to enroll land up to 150 feet from an eligible water body in the riparian project area in the program. Landowners who enroll are given the option of installing filter strips, riparian forest buffer, or grassed waterways along a stream. Some landowners may also be eligible for small wetland restoration. See Map 14, page 75.

In 1998, the state legislature developed and approved authorization for the funding and development of a state forestry cost-sharing program. The state cost-sharing program was named the **Wisconsin Forest Landowner Grant Program (WFLGP)**. WFLGP will cost-share a variety of forestry related conservation efforts that are included as part of the required forest stewardship plan. The stewardship plan is a forest management plan developed to meet the objectives of the landowner(s), plus address the wide range management needs on the property.

STORMWATER AND NONPOINT RUNOFF MANAGEMENT PROGRAMS

Polluted runoff contributes to habitat destruction, fish kills, reduction in drinking water quality, harbor and stream siltation, and a decline in recreational use of lakes and streams. Through both voluntary and regulatory programs, the WDNR's Runoff Management program works to decrease the impact of polluted runoff upon the water resources of Wisconsin. The runoff management program addresses sources of pollution from both agricultural and urban runoff (such as animal waste and storm sewers).

Want to know more about runoff management?
<http://www.dnr.state.wi.us/org/water/wm/index.htm>
<http://www.epa.gov/owow/nps/index.html>
<http://www.cwp.org/>

Municipal Storm Water Discharge Permit Program

This program is designed to address pollution caused by runoff from storm sewer systems serving urban areas. Right now, the cities of Madison and Milwaukee and several other municipalities in urbanized areas identified by the WDNR are required to obtain a permit to control their polluted runoff. The permit requires the municipality to develop a comprehensive storm water management program, including measures to address construction site erosion control, long term storm water management, elimination of illegal connections to storm sewers, prevention of dumping, and public education and outreach. Starting in 2003, many smaller municipalities may be required to obtain a permit and develop similar storm water management programs. The WDNR will be developing the criteria it will use to evaluate a municipality for possible permitting. Some of the possible criteria include the rate of growth of the municipality, the type of land use, and the quality of the water body receiving the runoff. Some of these communities may be Mount Horeb, Cross Plains, Poynette and Lodi.

Industrial Storm Water Discharge Permit Program

Many industrial facilities are required to obtain coverage under an industrial storm water discharge permit from the WDNR to control the pollution of storm water runoff from those facilities. The need for a permit is based upon the type of activity at the a facility and the potential for contamination of storm water runoff due to outdoor exposure of raw materials, final products, waste materials, equipment, and other materials. The permit requires the development and implementation of a storm water pollution prevention plan to ensure that the exposure to storm water is prevented or reduced.

Construction Site Storm Water Discharge Permit Program

Currently, construction sites where 5 or more acres of land will be disturbed require coverage under a construction site storm water discharge permit. The landowner is required to obtain the permit and ensure that a proper construction site erosion control and storm water management plan is developed and implemented for the site. The plan needs to specify what control practices will be used to prevent erosion and control sedimentation during construction, as well as what practices will be put into place to control pollution in storm water runoff after construction is complete (e.g., detention ponds, infiltration basins, grassed swales, etc.). In 2003, the acreage threshold for needing permit coverage will drop from 5 or more acres of land to 1 or more acre of land.

Want to know more about the stormwater discharge permit program?

<http://www.dnr.state.wi.us/org/water/wm/nps/stormwater.htm>

Manure Management Program

Wisconsin's Manure Management program requires very large animal operations or other operations with manure runoff, to control their polluted runoff. By requiring operations exceeding one thousand animal units (equivalent to 700 cows) to obtain a WPDES animal waste permit, the WDNR can reduce the water quality impacts from runoff of manure, which contains pollutants like bacteria, oxygen demanding organic material, and nutrients.

For both large and small livestock operations, new agricultural performance standards will prohibit direct runoff from a feedlot or stored manure from entering waters of the State. The new agricultural performance standards along with voluntary management practices will form the basis for Wisconsin's Manure Management program for the majority of livestock farms. Newly permitted operations are required to develop and implement nutrient management plans that will meet State standards and include a manure management plan. Of the 45,000 livestock operations in Wisconsin most will not require permits for the handling, storage or spreading of manure.

Sewer Service Area Plans

Sewer service area planning is required by the Federal Clean Water Act for communities within designated planning areas, or with populations larger than 10,000. Through this process, communities develop 20-year plans to guide placement of city sewer lines. The plan delineates lands that are most suitable for development and that can be serviced by a public wastewater collection and treatment system. To protect water resources, the plan designates "environmentally sensitive areas" where new sewered development is prohibited. If these protected areas were to be developed, bacteria, sediment, and other pollutants could find an easy route to lakes, streams, and groundwater. Regional staffs assist communities in developing sewer service area plans and identifying the environmentally sensitive areas, such as wetlands, shorelands, floodways, steep slopes, and highly erodible soils. These plans should be reviewed, and updated if necessary, every five years. The City of Baraboo is currently developing a Sewer Service Area Plan.

Financial Assistance for Runoff Management

Priority Watersheds and Priority Lakes

The program provides grants to local governmental units in both urban and rural watersheds selected for priority watershed projects. Grants can reimburse up to 70 percent of the cost of installing best management practices, which reduce the likelihood of pollutants being carried to streams, lakes or groundwater via runoff.

Targeted Runoff Management Grants

Targeted Runoff Management (TRM) Grants are competitive financial awards to support small-scale, short-term projects that are completed by local governmental. Both urban and rural projects can be funded through a TRM Grant. Up to 70% of a project can be funded through a TRM grant, to a maximum of \$150,000 in state funding.

Urban Nonpoint Source and Stormwater Grants

Urban Nonpoint Source and Stormwater Grants promote urban runoff management for existing urban areas, developing urban areas and urban re-development. Urban Nonpoint Grants can fund 70% of technical assistance while standard cost-share funds are available at 50% of the project cost.

WASTEWATER PROGRAM

Municipal and Industrial Wastewater Facilities

The WDNR regulates municipal and industrial facilities discharging wastewater to surface water or groundwater through the Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Program.

The state also requires all manufacturing industries, as well as transportation facilities that conduct vehicle maintenance, landfills, steam electric generating plants, auto salvage yards, and other specific operations to obtain a WPDES Stormwater Permit.

Want to know more about wastewater and stormwater?

<http://www.dnr.state.wi.us/org/water/wm/ww/index.htm>

<http://www.dnr.state.wi.us/org/water/wm/glwsp/ssaplan/controls.htm>

Waste Disposal

Municipal biosolids are the residual of the wastewater treatment process. Biosolids generally contain substantial levels of nitrogen, phosphorus, potassium and other nutrients. Unlike biosolids, septage is either the solids or wastewater generated by private on-site wastewater systems and treatment. Septage can be processed through sewage treatment plants or is directly land applied on approved sites. Site approval is based on the same criteria as that for municipal sludge.

Want to know more about waste disposal?

<http://www.dnr.state.wi.us/org/gmu/groundwaterfiles/wastedis.html>

Every application site must be approved prior to use. Approval is based upon many criteria, including site characteristics, slopes, setback from surface waters, residences, wells and public areas, depth to high groundwater or bedrock and soil permeability.

WATER MANAGEMENT PROGRAMS

The state's Water Management Programs protect and improve lakes and rivers in the Lower Wisconsin River Basin and statewide. The programs manage Wisconsin's sport, commercial and

Want to know more about lakes and rivers?

<http://www.dnr.state.wi.us/org/water/fhp/>

<http://www.dnr.state.wi.us/org/water/fhp/rivers/index.htm>

non-game fisheries and aquatic habitats, monitor water quality, and provide numerous grant programs.

Lake Management Program

The Lake Management Program protects and maintains Wisconsin's 15,000 inland lakes to provide a full complement of lake uses for all citizens. This program is a cooperative effort of the UW - Extension, local units of government, lake districts and associations, and lake-specific conservation and community groups. It helps coordinate action of the many WDNR programs that affect lakes. A major goal is ensuring that an adequate water quality database exists to support current and future management programs.

Aquatic Plant Management and Protection Program

This program regulates the use of chemical treatments to abate nuisances caused by excessive aquatic plant growth. The objective of the permit procedure is to preserve the ecological benefits of lake plant communities, including fish and wildlife habitat, erosion prevention, and water quality maintenance. The program also promotes alternative methods of control and appreciation of the benefits of aquatic plants. Quantitative aquatic plant surveys provide information that is used for fish habitat improvement, protection of sensitive wildlife areas, aquatic plant management, and water resource regulations.

Want to know more about aquatic plant management?
<http://www.dnr.state.wi.us/org/water/fhp/lakes/aquaplan.htm>

Self-Help Monitoring Program

The Self-Help Monitoring Program allows citizens to assist the WDNR with basic lake data collection, and to take an active role in lake management activities. Self-help volunteers are trained by a WDNR lake management specialist to measure water clarity, and conduct other monitoring on some lakes.

Want to know more about Self-help Monitoring?
<http://www.dnr.state.wi.us/org/water/fhp/lakes/shlmmain.htm>

Wisconsin Lakes Partnership Program

The Wisconsin Lakes Partnership Program, is a collaborative effort between the WDNR, UW-Extension, WAL and other stakeholders including lake organizations, property owners and local governments, to help ensure healthy and diverse lake ecosystems while considering the needs of society. Partnership priorities include adopt-a-lake and youth and adult education, aquatic plant management and protection, lake leadership training, lake organizational and technical assistance, lake planning and lake protection and classification grants, recreational boating aids and boating safety, self-help citizen lake monitoring, shoreland and water regulation and zoning, and wetland and watershed management.

The Lakes Partnership Program also acts as liaison with the U.S. Environmental Protection Agency (EPA) for the federal Clean Lake Grant Program. Cost-sharing grants support the planning and implementation of lake protection and restoration projects. Regional Water Team staffs apply to the EPA for grants on behalf of local project sponsors each year, and help administer successful grants.

Fisheries Monitoring and Management Programs

WDNR fisheries staff evaluate fish populations on lakes, flowages, rivers and streams. These evaluations include an assessment of fish community health, fish length, sex and age distributions, assessment of the impacts of stocking, habitat improvement and various regulations. This information is critical for sustaining good fishing and fish populations. Each year fisheries staff review and recommend stocking quotas and fishing regulation revisions for basin lakes and flowages, rivers and streams. They work with farmers, landowners, angling groups, lake associations and others to protect and restore aquatic and shoreline habitat, reduce bank erosion, improve trout habitat, and restore riverine environments through dam removal.

Surface Water Monitoring Programs

Currently, a variety of surface water monitoring approaches are implemented on streams and rivers in the basin. These include comprehensive stream surveys, surface water use classifications, complaint investigations, stream trend monitoring, toxics monitoring and special studies. The WDNR is currently developing statewide strategies to assess the status and trends of lake ecosystem health including biological and physical conditions, water chemistry, aquatic plants, fish, bottom-dwelling invertebrates, land use practices in the watershed, weather, and physical setting and historical data.

Grant Programs for Rivers, Streams and Lakes

In 1999, the legislature established the Rivers and Streams Planning and Protection Grant Program. Local units of government, qualified river management associations and non-profit conservation organizations can apply for state grant funds for planning, protection and restoration activities on rivers and streams. The Rivers Program assists local organizations by providing information on riverine ecosystems, improving river assessment and planning, and promoting local understanding of the causes of river problems. Activities that may receive funding include conservation easements, land acquisition, local regulations and ordinance development, pollution control practices, stream or shoreland habitat restoration, educational and monitoring activities.

Lake districts, lake associations, tribes, counties, cities, villages, or towns can apply for *Lake Planning Grants* to fund the collection of information on the quality of water in lakes, delineation of watershed boundaries, land use inventories, or studies of local zoning and shoreland regulations. Eligible projects include land acquisition, wetland restoration and local ordinance development to prevent lake ecosystem or water quality degradation.

<i>Rivers Grant Program:</i>	http://www.dnr.state.wi.us/org/water/fhp/rivers/
<i>Lakes Grant Program:</i>	http://www.dnr.state.wi.us/org/water/fhp/lakes/lkgrants.htm

WATERWAYS AND WETLANDS PROGRAMS

Waterways and Wetlands Permit and Regulatory Programs

WDNR staff assists with or manages a number of regulatory programs on the local, state and federal levels. These programs help to protect your water rights as well as public safety by ensuring adequate planning and design of projects affecting navigable public waters, shorelands and wetlands. Under Chapters 30 and 31 of Wisconsin Statutes, the WDNR reviews and processes permits for activities that involve physical alterations to surface waters.

The U.S. Army Corps of Engineers (COE) reviews and processes permit applications for projects located in navigable waters and wetlands under the Federal Clean Water Act. The state also approves projects in non-navigable wetlands and assures that water quality standards that have been established for public waters will not be violated.

State law requires counties, cities and villages to adopt and administer local regulations to control development along shorelands and in floodplains. The WDNR provides guidance for these programs. Activities such as flooding, draining, ditching, tiling, excavating, building and road construction are regulated in wetlands. Regulations in shoreland areas govern lot size, setbacks of buildings and structures from navigable waters, tree and shrub cutting, location and size of wastewater disposal systems, filling, and the construction of structures in floodplains.

Want to know more about waterways and wetlands?

<http://www.dnr.state.wi.us/org/water/fhp/>

<http://www.dnr.state.wi.us/org/water/fhp/waterway/index.htm>

<http://www.dnr.state.wi.us/org/water/wm/dsfm/>

<http://intranet.dnr.state.wi.us/int/water/fhp/wms/>

Wisconsin Wetland Inventory

As part of the state's effort to protect wetlands, the legislature established the Wisconsin Wetland Inventory in 1978. The WDNR was directed to inventory (map) Wisconsin's wetlands to obtain an accurate assessment of wetlands in the state. The initial inventory was completed in 1984.

Cost Share Programs for Waterways and Wetlands

The WDNR assists with wetlands and shoreland management and protection programs, in cooperation with an array of state, federal and local agencies. Farmlands adjacent to streams, lakes, ponds, sinkholes or wetlands that meet certain crop history requirements may be eligible under the ***Conservation Reserve Program*** (CRP) for cost sharing and rental payments to establish riparian buffers and filter strips.

The ***Wetlands Reserve Program*** (WRP) protects, restores and enhances wetlands and associated uplands through restoration of eligible lands using cost-share agreements and easement acquisition. The CRP and WRP programs are administered through the Consolidated Farm Services Agency (CFSA), with technical assistance from the county offices of the Natural Resources Conservation Service (NRCS) and the WDNR.

Other programs provide a variety of cost-share opportunities to restore habitat that can benefit wetlands, shorelands and other land and water resources. Examples include the Stewardship Incentive Program (SIP), Forest Incentives Program (FIP), Wildlife Habitat Incentive Program (WHIP), and the Wisconsin Forest Landowner Grant Program (WFLGP). Many state and federal conservation agencies as well as public and private-sector partners cooperate in the administration of these programs.

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CHAPTER 6: WATERSHED NARRATIVES

The following chapter provides summary information for watersheds in the Lower Wisconsin River Basin. The chapter begins with overviews of the basin's two main riverways, the Wisconsin and the Kickapoo Rivers, then proceeds to describe each of the basin's 29 watersheds. These narrative descriptions include maps, streams and lakes tables, recommended actions and references.

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CHAPTER 7: APPENDICES

APPENDIX A: SURVEY RESULTS FROM WDNR PUBLIC INFORMATIONAL MEETINGS HELD IN APRIL AND MAY 2001

Table 16: Natural Resource Issues of Concern to Survey Respondents

Concern	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
<i>Wildlife Habitat</i>				x	x					x			x			x	x				x	x				x	10
<i>Invasive plants</i>												x	x			x		x			x				x		7
<i>Nonpoint</i>				x	x					x						x					x			x	x		7
<i>Erosion (rural and urban)</i>	x		x			x														x		x				x	6
<i>Development/Parcelization</i>				x									x		x						x						5
<i>Pasturing/Grazing</i>	x	x	x																x			x					5
<i>Water Quality</i>	x							x	x	x												x					5
<i>Recreation/Economics</i>	x																			x						x	4
<i>Fishing</i>	x						x																	x			3
<i>Badger Army</i>								x		x																	2
<i>Dumping/Disposal</i>					x						x																2
<i>Groundwater</i>						x		x																			2
<i>Land Management</i>																x		x									2
<i>Manure Storage</i>	x										x																2
<i>Mining</i>								x																		x	2
<i>Shoreline Protection</i>													x						x								2
<i>Animal damage</i>												x															1
<i>Endangered species</i>																		x									1
<i>Hydrologic Modification</i>																									x		1
<i>Logging/ Forestry</i>												x															1
<i>Wetlands</i>																			x								1
<i>Wildlife</i>																										x	1

Table 17: Survey Respondents Ideas to Address Natural Resource Concerns

Ways to Address Concerns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
<i>Education</i>					x	x		x		x		x	x	x	x	x					x	x					11
<i>Increase cost-sharing and other funding</i>		x	x	x					x					x				x									8
<i>Increase enforcement</i>	x		x	x				x			x																5
<i>Increase monitoring</i>	x				x				x						x								x				5
<i>Conduct projects to address concerns</i>	x	x																							x		4
<i>Develop new laws, restrictions and regulations</i>		x												x					x					x			4
<i>Improve cooperation between stakeholders</i>																x				x					x		4
<i>Incentives</i>		x											x									x					3
<i>Prescribed burning</i>																x									x		3
<i>Media</i>			x								x																2
<i>Purchase conservation easements</i>													x														2
<i>Civic planning</i>																					x						1
<i>Create preserves</i>																		x									1
<i>Inventory problem areas</i>	x																										1
<i>Restore wetlands</i>																		x									1
<i>Revise current plans</i>																		x									1
<i>Zoning</i>													x														1

Table 18: Major Areas of Interest of Survey Respondents

Stream/River	Watershed	Ecosystem	Other
♦ Pine River	♦ Mill Creek Watershed	♦ Baraboo Hills	♦ Snow Bottom State Natural Area
♦ Big Green River	♦ Pine River Watershed	♦ Wetlands	♦ Devil's Lake State Park
♦ Honey Creek		♦ Remnant prairie	♦ Lower Wisconsin Riverway
♦ Rowan Creek		♦ High quality woodlands	♦ Badger Army Ammunition Plant
♦ Hinkson Creek		♦ Trout streams	♦ "Badlands" in Dellone/Delton Township
♦ Kickapoo River			♦ Proposed Aldo Leopold Wildlife Refuge
♦ Middle Wisconsin River			♦ FACT Area
♦ Baraboo River at confluence			♦ Sauk County
♦ Manley Creek			
♦ Castle Rock Creek			
♦ North Otter Creek			
♦ Black Earth Creek			

APPENDIX B: ATRAZINE PROHIBITION ZONES

Lower Wisconsin River Valley

The river terraces and flood plain on either side of the Wisconsin River downstream of the Highway 60 bridge at Prairie du Sac and upstream from the confluence of the Wisconsin River with the Mississippi Rivers are in an atrazine prohibition area. Some exceptions may exist.

Adams County

- ◆ Town of Dell Prairie, Sections 1, 2, 26, 27, 28, 33, 34, 35
- ◆ Town of New Haven, Sections, 5, 6
- ◆ Town of Jackson, Sections 7, 8, 17, 18, 29, 30, 31, 32
- ◆ Town of Springville, Sections 12, 13, 35, 36
- ◆ Town of Quincy, Sections 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29

Columbia County

- ◆ Town of Arlington, Sections 20 - 36
- ◆ Town of Leeds, All but sections 6, 7
- ◆ Town of Lowville, Sections 25 – 28, 31 – 36
- ◆ Town of Lowville, Sections 19, 30
- ◆ Town of Dekorra, Sections, 25, 26, 35, 26
- ◆ Town of Caledonia, Sections, 19, 23 – 25, 29 – 32, 36, 1, 6, 12

Dane County

- ◆ Town of Mazomanie, Sections 12 – 36 (north part), 1 – 15 (south part)
- ◆ Town of Roxbury, Sections 18 – 36
- ◆ Town of Dane, Sections 19 – 36
- ◆ Town of Berry, Sections 1 – 9, 11
- ◆ Town of Vermont, Sections 25, 36
- ◆ Town of Cross Plains, Sections 1 – 4, 8 – 17, 19 – 36
- ◆ Town of Blue Mounds, Sections, 1, 12, 13
- ◆ Town of Springfield, All but sections 5, 6, 7
- ◆ Town of Middleton, All
- ◆ Town of Verona, All
- ◆ Town of Springdale, All but sections 30, 31, 32

Iowa County

- ◆ Towns of Dodgeville and Ridgeway, Sections 20, 21, 28, 29

Juneau County

- ◆ Town of Lindina, Sections 3, 4, 8 – 10, 15 – 17
- ◆ Town of Lemonweir, Sections 25, 26, 35, 36

Monroe County

- ◆ Town of Adrian, Sections 1, 12, 13, 24
- ◆ Town of Tomah, Sections 6, 7, 18, 19, 20, 21, 28, 29
- ◆ Town of La Grange, Sections 3, 4, 9, 10

Richland County

- ◆ Town of Willow, Sections 4, 5, 8, 9, 16, 17

Sauk County

- ◆ Town of Dellona, Sections 1 – 5, 7 – 18, 21 – 28, 33 – 36
- ◆ Town of Delton, Sections 4 – 8, 18, 19, 30
- ◆ Town of Excelsior, Sections 1 – 4, 9 – 16
- ◆ Town of Woodland, Sections 3, 4, 9, 10
- ◆ Town of Troy, Section 1
- ◆ Town of Honey Creek, Sections 1, 12, 13, 25, 26, 35, 36
- ◆ Town of Sumpter, Sections 6, 7, 18

Vernon County

- ◆ Town of Viroqua, Sections 7, 8, 17 - 20

APPENDIX C: OUTSTANDING AND EXCEPTIONAL RESOURCE WATERS

Exceptional Resource Waters

<i>Waterbody Name</i>	<i>Location/Length</i>	<i>Watershed</i>	<i>Classification</i>
Plum Creek	All	LW02	ERW
Creek 6-11 (Tributary to Tainter Creek)	All (T11N R3W)	LW03	ERW
Reads Creek (Black Bottom Creek)	All	LW03	ERW
Tainter Creek	From Headwaters to CTH "B"	LW03	ERW
Bishop Branch	All	LW04	ERW
Seas Branch	Above pl 566 structure @ T13N R4W S14 NW	LW04	ERW
Buften Hollow Creek	T12N R2W S23	LW05	ERW
Cheyenne Valley Creek	All	LW05	ERW
South Bear Creek	T12N R2W S2	LW05	ERW
Crooked Creek	Above Hwy. 133	LW07	ERW
Boydton Creek	Above Hwy. 60	LW08	ERW
Hoover Hollow Creek	All	LW08	ERW
Big Spring Branch	From Springhead to Blue River	LW09	ERW
Blue River	Headwaters to Biba Rd	LW09	ERW
Doc Smith Branch	Below section 7, T6NR1W	LW09	ERW
Babb Hollow Creek	All	LW10	ERW
Coulter Hollow Creek	All	LW10	ERW
East Branch Mill Creek	All	LW10	ERW
Fox Hollow Creek	All	LW10	ERW
Higgins Creek	All	LW10	ERW
Hood Hollow Creek	All	LW10	ERW
Kepler Branch	All	LW10	ERW
Mill Creek (Richland)	From headwaters to above Boaz	LW10	ERW
Miller Branch	All	LW10	ERW
Pine Valley Creek	All	LW10	ERW
Ryan Hollow	All	LW10	ERW
West Branch Mill Creek	All	LW10	ERW
Harker Creek	From headwaters to T6N R2E S10	LW11	ERW
Lee Creek	From headwaters to T6N R2E S10	LW11	ERW
Martin Creek	From headwaters to T6N R2E S10	LW11	ERW
Happy Hollow Creek	All	LW12	ERW
Jacquish Hollow Creek	All	LW12	ERW
Lost Hollow Creek	All	LW12	ERW
Smith Hollow Creek	All	LW12	ERW
Wheat Hollow Creek	All	LW12	ERW
Willow Creek (Richland County)	Ithaca Dam to County Line	LW12	ERW
Creek 10-8 (Tributary to Fancy Creek)	All (T11N R1W)	LW13	ERW
Creek 24-3A (Tributary to Fancy Creek)	All (T11N R1W)	LW13	ERW
Creek 3-4d (Tributary to Melancthon)	All (T12N R1E)	LW13	ERW
Creek 4-9 (Tributary to Fancy Creek)	All (T1N R1W)	LW13	ERW
Fancy Creek	Upper 1 mile	LW13	ERW
Gault Hollow Creek	Above CTH I	LW13	ERW
Grinsell Creek	All	LW13	ERW
Hanzel Creek	All	LW13	ERW
Marshall Creek	T11N R1W S4	LW13	ERW
Melancthon Creek (Milancthon)	All	LW13	ERW
Biser Creek	T12N R3W S3	LW14	ERW
Creek (Tributary to Marble Creek)	All (T10N R3E S29)	LW14	ERW
Marble Creek	T10N R3E S30	LW14	ERW
Elvers Creek (Bohn Creek)	All	LW15	ERW
Ryan Creek	All	LW15	ERW
Black Earth Creek	From easternmost CTY KP crossing downstream to Garfoot Creek	LW17	ERW

<i>Waterbody Name</i>	<i>Location/Length</i>	<i>Watershed</i>	<i>Classification</i>
Garfoot Creek	All	LW17	ERW
Dunlap Creek	All	LW18	ERW
Durward Glen Creek (Prentice Creek)	Above Hwy. 78	LW19	ERW
Rowan Creek	Above Poynette sewage plant	LW19	ERW
Spring Creek	All	LW19	ERW
Roelke Creek	T12N R11E S30 to mid Duck Creek	LW20	ERW
Boulder Creek	All	LW21	ERW
Rowley Creek	All	LW21	ERW
Campbell Creek	Upstream from Easton Pond	LW25	ERW
Corning Creek	All	LW25	ERW
Fairbanks Creek	All	LW25	ERW
Gulch Creek (Witches Gulch)	All	LW25	ERW
Plainville Creek	Upstream from Hwy. 13	LW25	ERW
Beaver Creek	All	LW26	ERW
Camels Creek	All	LW26	ERW
Dell Creek	All	LW26	ERW
Gilmore Creek	Downstream from Trout Lake	LW26	ERW
Hulburt Creek	Hwy. H bridge upstream	LW26	ERW
Brewer Creek	All	LW27	ERW
Creek 27-9 (Tributary to Onemile Creek)	All (T15N R3E)	LW27	ERW
Onemile Creek	Steamboat Rock upstream	LW27	ERW
Creek 8-1 (Tributary to Mill Creek)	All (T18N R1W)	LW28	ERW
Mill Creek (Monroe)	Hwy. 12 upstream	LW28	ERW
Creek 20-12 (Tributary to Mud Creek)	All (18N R1W)	LW29	ERW
Deer Creek	All	LW29	ERW
Hoten Creek	All	LW29	ERW
Little Lemonweir River	East edge of SE1/4 S7 T16N R1E upstream	LW29	ERW
Mud Creek	24th Ave. upstream of jct of creek 20-12 T18N R1W	LW29	ERW
Wisconsin River	From Prairie du Sac to Prairie du Chien	Multiple	ERW

Outstanding Resource Waters

<i>Waterbody Name</i>	<i>Location/Length</i>	<i>Watershed</i>	<i>Classification</i>
Camp Creek	All	LW05	ORW
Elk Creek	All	LW05	ORW
Big Green River	Above Hwy. 133	LW07	ORW
Little Green River	All	LW07	ORW
Fennimore Fork (Castle Rock Creek)	Above Witek Rd	LW09	ORW
Love Creek	All	LW15	ORW
Strutt Creek	All	LW15	ORW
Trout Creek (Iowa County)	Big Spring to mouth	LW15	ORW
Otter Creek	From headwaters to south section line of T11N R6E S33	LW16	ORW
Black Earth Creek	Above the easternmost CTH KP crossing	LW17	ORW
Parfrey's Glen	From headwaters to CTH DL	LW19	ORW

APPENDIX D: IMPAIRED WATERS (SECTION 303D) - LOWER WISCONSIN RIVER BASIN

<i>Waterbody Name</i>	<i>Watershed</i>	<i>Stream Miles</i>	<i>Total Miles</i>	<i>Impairment</i>	<i>County</i>
Sand Creek	LW02	0-5	5	Nonpoint Pollution	Crawford
Halls Branch Creek	LW02	2-5	3	Nonpoint Pollution	Crawford
Kickapoo River near Steuben	LW02	-	5	Other	Crawford
Jug Creek	LW05	0-4	4	Nonpoint Pollution	Vernon
Blue River	LW09	31.8-36	4	Nonpoint Pollution	Iowa
Fennimore Fork	LW09	15.5-26	10	Nonpoint Pollution	Grant
Otter Creek	LW11	0-15.3	15	Nonpoint Pollution	Iowa
Otter Creek	LW11	15.3-13.3	8	Nonpoint Pollution	Iowa
Rush Creek	LW11	0-5	5	Nonpoint Pollution	Iowa
Little Willow Creek	LW12	0-7.5	8	Nonpoint Pollution	Richland
Melancthon Creek	LW13	6.4-9	3	Nonpoint Pollution	Richland
Wendt Creek	LW17	0-6	6	Nonpoint Pollution	Dane
Halfway Prairie Creek	LW19	0-8	8	Nonpoint Pollution	Dane
Rowan Creek	LW19	0-8	8	Nonpoint and Point Source Pollution	Columbia
Baraboo River	LW21	-	2	Habitat	Sauk
Babb Creek	LW23	0-6	6	Nonpoint Pollution	Sauk
Crossman Creek	LW23	0-4.5	4	Nonpoint Pollution	Juneau
Dutch Hollow Lake	LW23	0	0	Atmospheric Deposition	Sauk
Silver Creek	LW23	0-4	4	Nonpoint Pollution	Sauk
W. Branch Baraboo River	LW24	3.25-5.0	2	Habitat	Vernon
Lemonweir River at New Lisbon Flowage	LW29	0	0	Atmospheric Deposition	Juneau
S. Fork Lemonweir River - Tomah Lake	LW29	4.4-8.8	4	Habitat	Monroe

APPENDIX E: NATURAL HERITAGE INVENTORY SPECIES - L. WISCONSIN BASIN

Mammals, Reptiles, Amphibians and Mollusks

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS	TAXA GROUP
APALONE MUTICA	MIDLAND SMOOTH SOFTSHELL TURTLE	SC/H		TURTLE^
ACRIS CREPITANS BLANCHARDI	BLANCHARD'S CRICKET FROG	END		FROG^
RANA CATESBEIANA	BULLFROG	SC/H		FROG^
OPHISAURUS ATTENUATUS	WESTERN SLENDER GLASS LIZARD	END		LIZARD
PIPISTRELLUS SUBFLAVUS	EASTERN PIPISTRELLE	SC/N		MAMMAL
SPERMOPHILUS FRANKLINII	FRANKLIN'S GROUND SQUIRREL	SC/N		MAMMAL
MYOTIS SEPTENTRIONALIS	NORTHERN MYOTIS	SC/N		MAMMAL
MICROTUS OCHROGASTER	PRAIRIE VOLE	SC/N		MAMMAL
REITHRODONTOMYS MEGALOTIS	WESTERN HARVEST MOUSE	SC/N		MAMMAL
MICROTUS PINETORUM	WOODLAND VOLE	SC/N		MAMMAL
SOREX ARCTICUS	ARCTIC SHREW	SC/N		MAMMAL^
CRYPTOTIS PARVA	LEAST SHREW	SC/N		MAMMAL^
SOREX HOYI	PIGMY SHREW	SC/N		MAMMAL^
HEMIDACTYLUM SCUTATUM	FOUR-TOED SALAMANDER	SC		SALAMANDER^
HENDERSONIA OCCULTA	CHERRYSTONE DROP	THR		SNAIL
ZONITOIDES LIMATULUS	DULL GLOSS	SC/N		SNAIL
HELICODISCUS SINGLEYANUS	SMOOTH COIL	SC		SNAIL
GASTROCOPTA PROCERA	WING SNAGGLETOOTH	THR		SNAIL
PITUOPHIS CATENIFER SAYI	BULLSNAKE	SC/P		SNAKE
DIADOPHIS PUNCTATUS EDWARDSII	NORTHERN RINGNECK SNAKE	SC/N		SNAKE
DIADOPHIS PUNCTATUS ARNYI	PRAIRIE RINGNECK SNAKE	SC/H		SNAKE
COLUBER CONSTRICTOR	YELLOW-BELLIED RACER	SC/P		SNAKE
ELAPHE OBSOLETA	BLACK RAT SNAKE	SC/N		SNAKE
THAMNOPHIS SAURITUS	NORTHERN RIBBON SNAKE	END		SNAKE^
THAMNOPHIS PROXIMUS	WESTERN RIBBON SNAKE	END		SNAKE^

Birds

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS	TAXA GROUP
EMPIDONAX VIRESCENS	ACADIAN FLYCATCHER	THR		BIRD
VIREO BELLII	BELL'S VIREO	THR		BIRD
DENDROICA CERULEA	CERULEAN WARBLER	THR		BIRD
SPIZA AMERICANA	DICKCISSEL	SC/M		BIRD
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	SC/M		BIRD
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	THR		BIRD
OPORORNIS FORMOSUS	KENTUCKY WARBLER	THR		BIRD
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	END		BIRD
ICTERUS SPURIUS	ORCHARD ORIOLE	SC/M		BIRD
FALCO PEREGRINUS	PEREGRINE FALCON	END	E(S/A)	BIRD
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER	SC/M		BIRD
TYMPANUCHUS PHASIANELLUS	SHARP-TAILED GROUSE	SC/M		BIRD
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	SC/M		BIRD
STURNELLA NEGLECTA	WESTERN MEADOWLARK	SC/M		BIRD
HELMITHEROS VERMIVORUS	WORM-EATING WARBLER	END		BIRD
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	SC/M		BIRD^
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	SC/FL	LTNL	BIRD^
CHLIDONIAS NIGER	BLACK TERN	SC/M		BIRD^
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON	SC/M		BIRD^
GAVIA IMMER	COMMON LOON	SC/M		BIRD^
ARDEA ALBA	GREAT EGRET	THR		BIRD^
WILSONIA CITRINA	HOODED WARBLER	THR		BIRD^
RALLUS ELEGANS	KING RAIL	SC/M		BIRD^
AMMODRAMUS LECONTEI	LE CONTE'S SPARROW	SC/M		BIRD^
IXOBRYCHUS EXILIS	LEAST BITTERN	SC/M		BIRD^
SEIURUS MOTACILLA	LOUISIANA WATERTHRUSH	SC/M		BIRD^
CIRCUS CYANEUS	NORTHERN HARRIER	SC/M		BIRD^
PANDION HALIAETUS	OSPREY	THR		BIRD^
BUTEO LINEATUS	RED-SHOULDERED HAWK	THR		BIRD^
CYGNUS BUCCINATOR	TRUMPETER SWAN	END		BIRD^
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON	THR		BIRD^

Insects				
SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS	TAXA GROUP
CICINDELA MACRA	A TIGER BEETLE	SC/N		BEETLE
CICINDELA PATRUELA HUBERI	A TIGER BEETLE	SC/N		BEETLE
CICINDELA PATRUELA PATRUELA	A TIGER BEETLE	SC/N		BEETLE
CICINDELA LEPIDA	LITTLE WHITE TIGER BEETLE	SC/N		BEETLE
MEGACEPHALA VIRGINICA	VIRGINIA BIG-HEADED TIGER BEETLE	SC/N		BEETLE
HYDROCANTHUS IRICOLOR	A BURROWING WATER BEETLE	SC/N		BEETLE^
HALIPLUS PANTHERINUS	A CRAWLING WATER BEETLE	SC/N		BEETLE^
AGABUS CANADENSIS	A PREDACEOUS DIVING BEETLE	SC/N		BEETLE^
AGABUS CONFUSUS	A PREDACEOUS DIVING BEETLE	SC/N		BEETLE^
LIOPOREUS TRIANGULARIS	A PREDACEOUS DIVING BEETLE	SC/N		BEETLE^
SPERCHOPSIS TESSELLATUS	A WATER SCAVENGING BEETLE	SC/N		BEETLE^
LIODESSUS CANTRALLI	CANTRALL'S BOG BEETLE	SC/N		BEETLE^
STENELMIS DOUGLASENSIS	DOUGLAS STENELMIS RIFFLE BEETLE	SC/N		BEETLE^
STENELMIS KNOBELI	KNOBEL'S RIFFLE BEETLE	END		BEETLE^
NEPA APICULATA	A WATER SCORPION	SC/N		BUG^
POANES VIATOR	BROAD-WINGED SKIPPER	SC/N		BUTTERFLY
HESPERIA METEA	COBWEB SKIPPER	SC/N		BUTTERFLY
ERYNNIS LUCILIUS	COLUMBINE DUSKY WING	SC/N		BUTTERFLY
ATRYTONOPSIS HIANNA	DUSTED SKIPPER	SC/N		BUTTERFLY
CHLOSYPNE GORGONE	GORGONE CHECKER SPOT	SC/N		BUTTERFLY
OENEIS JUTTA	JUTTA ARCTIC	SC/N		BUTTERFLY
LYCAEIDES MELISSA SAMUELIS	KARNER BLUE BUTTERFLY	SC/N	LE	BUTTERFLY
HESPERIA LEONARDUS PAWNEE	LEONARD'S PAWNEE SKIPPER	SC/N		BUTTERFLY
ERYNNIS MARTIALIS	MOTTLED DUSKY WING	SC/N		BUTTERFLY
CALLOPHRYS GRYPHEA	OLIVE HAIRSTREAK	SC/N		BUTTERFLY
HESPERIA OTTOE	OTTOE SKIPPER	SC/N		BUTTERFLY
ERYNNIS PERSIUS	PERSIUS DUSKY WING	SC/N		BUTTERFLY
ERYNNIS BAPTISIAE	WILD INDIGO DUSKY WING	SC/N		BUTTERFLY
LYCAENA EPIXANTHE	BOG COPPER	SC/N		BUTTERFLY^
EUPHYES DION	DION SKIPPER	SC/N		BUTTERFLY^
LYCAENA DIONE	GREAT COPPER	SC/N		BUTTERFLY^
LYCAENA XANTHOIDES	GREAT COPPER	SC/N		BUTTERFLY^
POANES MASSASOIT	MULBERRY WING	SC/N		BUTTERFLY^
EUPHYES BIMACULA	TWO-SPOTTED SKIPPER	SC/N		BUTTERFLY^
LEPIDOSTOMA LIBUM	A BIZARRE CADDISFLY	SC/N		CADDISFLY^
LEPIDOSTOMA VERNALE	A BIZARRE CADDISFLY	SC/N		CADDISFLY^
ASYNARCHUS ROSSI	A NORTHERN CASEMAKER CADDISFLY	SC/N		CADDISFLY^
LESTES EURINUS	AMBER-WINGED SPREADWING	SC/N		DRAGONFLY^
CORDULEGASTER OBLIQUA	ARROWHEAD SPIKETAIL	SC/N		DRAGONFLY^
OPHIOGOMPHUS SP 1 NR ASPERSUS	BARRENS SNAKETAIL	SC/N		DRAGONFLY^
SYMPETRUM DANAE	BLACK MEADOWHAWK	SC/N		DRAGONFLY^
AESHNA TUBERCULIFERA	BLACK-TIPPED DARNER	SC/N		DRAGONFLY^
SOMATOCHLORA TENEBROSA	CLAMP-TIPPED EMERALD	SC/N		DRAGONFLY^
NASIAESCHNA PENTACANTHA	CYRANO DARNER	SC/N		DRAGONFLY^
SOMATOCHLORA FRANKLINI	DELICATE EMERALD	SC/N		DRAGONFLY^
WILLIAMSONIA FLETCHERI	EBONY BOG HAUNTER	SC/N		DRAGONFLY^
LESTES INAEQUALIS	ELEGANT SPREADWING	SC/N		DRAGONFLY^
STYLURUS NOTATUS	ELUSIVE CLUBTAIL	SC/N		DRAGONFLY^
ISCHNURA POSITA	FRAGILE FORKTAIL	SC/N		DRAGONFLY^
ARCHILESTES GRANDIS	GREAT SPREADWING	SC/N		DRAGONFLY^
GOMPHUS VIRIDIFRONS	GREEN-FACED CLUBTAIL	SC/N		DRAGONFLY^
AESHNA VERTICALIS	GREEN-STRIPED DARNER	SC/N		DRAGONFLY^
SOMATOCHLORA KENNEDYI	KENNEDY'S EMERALD	SC/N		DRAGONFLY^
GOMPHURUS EXTERNUS	PLAINS CLUBTAIL	SC/N		DRAGONFLY^
WILLIAMSONIA LINTNERI	RINGED BOGHAUNTER	SC/N		DRAGONFLY^
MACROMIA TAENIOLATA	ROYAL RIVER CRUISER	SC/N		DRAGONFLY^
STYLURUS PLAGIATUS	RUSSET-TIPPED CLUBTAIL	SC/N		DRAGONFLY^
SOMATOCHLORA ELONGATA	SKI-TAILED EMERALD	SC/N		DRAGONFLY^
NEUROCORDULIA MOLESTA	SMOKY SHADOWFLY	SC/N		DRAGONFLY^
NEUROCORDULIA YAMASKANENSIS	STYGIAN SHADOWFLY	SC/N		DRAGONFLY^
EPIAESCHNA HEROS	SWAMP DARNER	SC/N		DRAGONFLY^
LESTES VIGILAX	SWAMP SPREADWING	SC/N		DRAGONFLY^
SOMATOCHLORA INCURVATA	WARPAINT EMERALD	END		DRAGONFLY^

LIBELLULA CYANEA	WHITE-SPANGLED SKIMMER	SC/N		DRAGONFLY^
MELANOPLUS FLAVIDUS	BLUE-LEGGED GRASSHOPPER	SC/N		GRASSHOPPER
SPHARAGEMON MARMORATA	NORTHERN MARBLED LOCUST	SC/N		GRASSHOPPER
PSINIDIA FENESTRALIS	SAND LOCUST	SC/N		GRASSHOPPER
DICHROMORPHA VIRIDIS	SHORT-WINGED GRASSHOPPER	SC/N		GRASSHOPPER
STETHOPHYMA LINEATA	STRIPED SEDGE GRASSHOPPER	SC/N		GRASSHOPPER
ATTENUIPYGA VANDUZEEI	A PRAIRIE LEAFHOPPER	SC/N		LEAFHOPPER
POLYAMIA DILATA	NET-VEINED LEAFHOPPER	THR		LEAFHOPPER
AFLEXIA RUBRANURA	RED-TAILED PRAIRIE LEAFHOPPER	END		LEAFHOPPER
ANEPEORUS SIMPLEX	A FLAT-HEADED MAYFLY	END		MAYFLY^
MACDUNNOA PERSIMPLEX	A HEPTAGENIID MAYFLY	SC/N		MAYFLY^
PSEUDIRON CENTRALIS	A HEPTAGENIID MAYFLY	SC/N		MAYFLY^
PARACLOEODES MINUTUS	A SMALL MINNOW MAYFLY	SC/N		MAYFLY^
ACANTHAMETROPUS PECATONICA	PECATONICA RIVER MAYFLY	END		MAYFLY^
CATOCALA ABBREVIATELLA	ABBREVIATED UNDERWING MOTH	SC/N		MOTH
PHYTOMETRA ERESTINANA	ERNESTINE'S MOTH	SC/N		MOTH
HEMILEUCA SP 3	MIDWESTERN FEN BUCKMOTH	SC/N		MOTH
MEROPLEON AMBIFUSCA	NEWMAN'S BROCADE	SC/N		MOTH
GRAMMIA OITHONA	OITHONA TIGER MOTH	SC/N		MOTH
GRAMMIA PHYLLIRA	PHYLLIRA TIGER MOTH	SC/N		MOTH
CATOCALA WHITNEYI	WHITNEY'S UNDERWING MOTH	SC/N		MOTH
PAPAPEMA SILPHII	SILPHIUM BORER MOTH	END		MOTH^
ZEALEUCTRA NARFI	A ROLLED-WINGED WINTER STONEFLY	SC/N		STONEFLY^

Fish and Mussels

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS	TAXA GROUP
ANGUILLA ROSTRATA	AMERICAN EEL	SC/N		FISH^
FUNDULUS DIAPHANUS	BANDED KILLIFISH	SC/N		FISH^
ICTIOBUS NIGER	BLACK BUFFALO	THR		FISH^
MOXOSTOMA DUQUESNEI	BLACK REDHORSE	END		FISH^
CYCLEPTUS ELONGATUS	BLUE SUCKER	THR		FISH^
CRYSTALLARIA ASPRELLA	CRYSTAL DARTER	END		FISH^
HIODON ALOSOIDES	GOLDEYE	END		FISH^
MOXOSTOMA VALENCIENNESI	GREATER REDHORSE	THR		FISH^
ERIMYZON SUCETTA	LAKE CHUBSUCKER	SC/N		FISH^
ACIPENSER FULVESCENS	LAKE STURGEON	SC/H		FISH^
ETHEOSTOMA MICROPERCA	LEAST DARTER	SC/N		FISH^
ETHEOSTOMA ASPRIGENE	MUD DARTER	SC/N		FISH^
NOTROPIS NUBILUS	OZARK MINNOW	THR		FISH^
POLYODON SPATHULA	PADDLEFISH	THR		FISH^
NOTROPIS AMNIS	PALLID SHINER	END		FISH^
APHREDODERUS SAYANUS	PIRATE PERCH	SC/N		FISH^
OPSOPOEODUS EMILIAE	PUGNOSE MINNOW	SC/N		FISH^
LYTHRURUS UMBRATILIS	REDFIN SHINER	THR		FISH^
CLINOSTOMUS ELONGATUS	REDSIDE DACE	SC/N		FISH^
MACRHYBOPSIS STORERIANA	SILVER CHUB	SC/N		FISH^
MACRHYBOPSIS AESTIVALIS	SPECKLED CHUB	THR		FISH^
FUNDULUS DISPAR	STARHEAD TOPMINNOW	END		FISH^
NOTROPIS TEXANUS	WEED SHINER	SC/N		FISH^
ETHEOSTOMA CLARA	WESTERN SAND DARTER	SC/N		FISH^
TRITOGONIA VERRUCOSA	BUCKHORN	THR		MUSSEL^
PLETHOBASUS CYPHYUS	BULLHEAD	END		MUSSEL^
ELLIPSARIA LINEOLATA	BUTTERFLY	END		MUSSEL^
FUSCONAIA EBENA	EBONY SHELL	END		MUSSEL^
ALASMIDONTA MARGINATA	ELKTOE	SC/H		MUSSEL^
ANODONTA SUBORBICULATA	FLAT FLOATER	SC/H		MUSSEL^
LAMPSILIS HIGGINSII	HIGGINS' EYE	END	LE	MUSSEL^
QUADRULA METANEVRA	MONKEYFACE	THR		MUSSEL^
ARCIDENS CONFRAGOSUS	ROCK POCKETBOOK	THR		MUSSEL^
PLEUROBEMA SINTOXIA	ROUND PIGTOE	SC/H		MUSSEL^
SIMPSONAIAS AMBIGUA	SALAMANDER MUSSEL	THR		MUSSEL^
LAMPSILIS TERES TERES	SLOUGH SANDSHELL	END		MUSSEL^
QUADRULA NODULATA	WARTYBACK	THR		MUSSEL^
MEGALONAIAS NERVOSA	WASHBOARD	SC/H		MUSSEL^
QUADRULA FRAGOSA	WINGED MAPLELEAF	END	LE	MUSSEL^
MUSSEL BED	MUSSEL BED	SC		OTHER^

Plants and Plant Communities

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS	TAXA GROUP
PARTHENIUM INTEGRIFOLIUM	AMERICAN FEVER-FEW	THR		PLANT
LITHOSPERMUM LATIFOLIUM	AMERICAN GROMWELL	SC		PLANT
CROTALARIA SAGITTALIS	ARROW-HEADED RATTLE-BOX	SC		PLANT
CORALLORRHIZA ODONTORHIZA	AUTUMN CORAL-ROOT	SC		PLANT
PRIMULA MISTASSINICA	BIRD'S-EYE PRIMROSE	SC		PLANT
OPUNTIA FRAGILIS	BRITTLE PRICKLY-PEAR	THR		PLANT
PHEGopteris hexagonoptera	BROAD BEECH FERN	SC		PLANT
ASTER DUMOSUS VAR STRICTIOR	BUSHY ASTER	SC		PLANT
DIODIA TERES VAR TERES	BUTTONWEED	SC		PLANT
GNAPHALIUM HELLERI	CATFOOT	SC		PLANT
POLYSTICHUM ACROSTICHOIDES	CHRISTMAS FERN	SC		PLANT
PHLOX BIFIDA	CLEFT PHLOX	SC		PLANT
GNAPHALIUM OBTUSIFOLIUM VAR SAXICOLA	CLIFF CUDWEED	THR		PLANT
ADLUMIA FUNGOSA	CLIMBING FUMITORY	SC		PLANT
FESTUCA PARADOXA	CLUSTER FESCUE	SC		PLANT
OROBANCHE FASCICULATA	CLUSTERED BROOMRAPE	THR		PLANT
CALLIRHOE TRIANGULATA	CLUSTERED POPPY-MALLOW	SC		PLANT
ARABIS MISSOURIENSIS VAR DEAMII	DEAM'S ROCKCRESS	SC		PLANT
CAREX PRASINA	DROOPING SEDGE	THR		PLANT
CAREX ARTITECTA	DRY WOODS SEDGE	SC		PLANT
VACCINIUM CESPITOSUM	DWARF HUCKLEBERRY	END		PLANT
ASCLEPIAS OVALIFOLIA	DWARF MILKWEED	THR		PLANT
ANEMONE MULTIFIDA VAR HUDSONIANA	EARLY ANEMONE	END		PLANT
CIRSIUM FLODMANII	FLODMAN THISTLE	SC		PLANT
DRYOPTERIS FRAGRANS VAR REMOTIUSCULA	FRAGRANT FERN	SC		PLANT
RHUS AROMATICA	FRAGRANT SUMAC	SC		PLANT
DIPLAZIUM PYCNOCARPON	GLADE FERN	SC		PLANT
CACALIA MUEHLENBERGII	GREAT INDIAN-PLANTAIN	SC		PLANT
PENSTEMON HIRSUTUS	HAIRY BEARDTONGUE	SC		PLANT
RUPELLIA HUMILIS	HAIRY WILD-PETUNIA	END		PLANT
CIRSIUM HILLII	HILL'S THISTLE	THR		PLANT
PLATANThERA HOOKERI	HOOKEr ORCHIS	SC		PLANT
HEDYOTIS CAERULEA	INNOCENCE	SC		PLANT
GYMNOCLADUS DIOICUS	KENTUCKY COFFEE-TREE	SC		PLANT
RHAMNUS LANCEOLATA VAR GLABRATA	LANCED-LEAVED BUCK-THORN	SC		PLANT
PLATANThERA ORBICULATA	LARGE ROUNDLEAF ORCHID	SC		PLANT
GYMNOCARPIUM ROBERTIANUM	LIMESTONE OAK FERN	SC		PLANT
ASPLENIUM PINNATIFIDUM	LOBED SPLEENWORT	THR		PLANT
ASPLENIUM TRICHOMANES	MAIDENHAIR SPLEENWORT	SC		PLANT
ONOSMODIUM MOLLE	MARBLESEED	SC		PLANT
CASSIA MARILANDICA	MARYLAND SENNA	SC		PLANT
DASISTOMA MACROPHYLLA	MULLEIN FOXGLOVE	SC		PLANT
ADOXA MOSCHATELLINA	MUSK-ROOT	THR		PLANT
COMMELINA ERECTA VAR DEAMIANA	NARROW-LEAVED DAYFLOWER	SC		PLANT
VERBENA SIMPLEX	NARROW-LEAVED VERVAIN	SC		PLANT
TRIPHORA TRIANTHOPHORA	NODDING POGONIA	SC		PLANT
PRENANTHES CREPIDINEA	NODDING RATTLESNAKE-ROOT	END		PLANT
GYMNOCARPIUM JESSEENSE	NORTHERN OAK FERN	SC		PLANT
SPIRANTHES OVALIS VAR EROSTELLATA	OCTOBER LADY'S-TRESSES	SC		PLANT
OROBANCHE UNIFLORA	ONE-FLOWERED BROOMRAPE	SC		PLANT
WOODSIA OREGANA VAR CATHCARTIANA	OREGON WOODSIA (TETRAPLOID)	SC		PLANT
PENSTEMON PALLIDUS	PALE BEARDTONGUE	SC		PLANT
AGALINIS SKINNERIANA	PALE FALSE FOXGLOVE	END		PLANT
PLATANThERA FLAVA VAR HERBIOLA	PALE GREEN ORCHID	THR		PLANT
ECHINACEA PALLIDA	PALE-PURPLE CONEFLOWER	THR		PLANT
PSORALEA ESCULENTA	POMME-DE-PRAIRIE	SC		PLANT
LESPEDeza LEPTOSTACHYA	PRAIRIE BUSH-CLOVER	END	LT	PLANT
NOTHOCALAIS CUSPIDATA	PRAIRIE FALSE-DANDELION	SC		PLANT
TALINUM RUGOSPERMUM	PRAIRIE FAME-FLOWER	SC		PLANT
CACALIA TUBEROSA	PRAIRIE INDIAN PLANTAIN	THR		PLANT
ARTEMISIA FRIGIDA	PRAIRIE SAGEBRUSH	SC		PLANT
CLEMATIS OCCIDENTALIS	PURPLE CLEMATIS	SC		PLANT
ASCLEPIAS PURPURASCENS	PURPLE MILKWEED	END		PLANT

PELLAEA ATROPURPUREA	PURPLE-STEM CLIFF-BRAKE	SC		PLANT
TRILLIUM RECURVATUM	REFLEXED TRILLIUM	SC		PLANT
CAREX RICHARDSONII	RICHARDSON SEDGE	SC		PLANT
LYCOPODIUM POROPHILUM	ROCK CLUBMOSS	SC		PLANT
MINUARTIA DAWSONENSIS	ROCK STITCHWORT	SC		PLANT
CAREX BACKII	ROCKY MOUNTAIN SEDGE	SC		PLANT
DIODIA TERES	ROUGH BUTTONWEED			PLANT
PRENANTHES ASPERA	ROUGH RATTLESNAKE-ROOT	END		PLANT
AGALINIS GATTINGERI	ROUNDSTEM FOXGLOVE	THR		PLANT
VIOLA FIMBRIATULA	SAND VIOLET	END		PLANT
AMMANNIA ROBUSTA	SCARLET LOOSESTRIPE	SC		PLANT
SOLIDAGO SCIAPHILA	SHADOWY GOLDENROD	SC		PLANT
ARISTIDA DICHOTOMA	SHINNERS THREE-AWNED GRASS	SC		PLANT
ARABIS SHORTII	SHORT'S ROCK-CRESS	SC		PLANT
PSORALEA ARGOPHYLLA	SILVERY SCURF PEA	SC		PLANT
LESPEDeza VIRGINICA	SLENDER BUSH-CLOVER	THR		PLANT
SCUTELLARIA PARVULA VAR PARVULA	SMALL SKULLCAP	END		PLANT
STROPHOSTYLES LEIOSPERMA	SMALL-FLOWERED WOOLLY BEAN	SC		PLANT
TRILLIUM NIVALE	SNOW TRILLIUM	THR		PLANT
SILENE NIVEA	SNOWY CAMPION	THR		PLANT
SCIRPUS TORREYI	TORREY'S BULRUSH	SC		PLANT
JEFFERSONIA DIPHYLLA	TWINLEAF	SC		PLANT
EUPATORIUM SESSILIFOLIUM VAR BRITTONIANUM	UPLAND BONESET	SC		PLANT
LESPEDeza VIOLACEA	VIOLET BUSH-CLOVER	SC		PLANT
PTELEA TRIFOLIATA	WAFER-ASH	SC		PLANT
PANICUM WILCOXIANUM	WILCOX PANIC GRASS	SC		PLANT
CAMASSIA SCILLOIDES	WILD HYACINTH	END		PLANT
ASCLEPIAS LANUGINOSA	WOOLY MILKWEED	THR		PLANT
CALYLOPHUS SERRULATUS	YELLOW EVENING PRIMROSE	SC		PLANT
GENTIANA ALBA	YELLOW GENTIAN	THR		PLANT
AGASTACHE NEPETOIDES	YELLOW GIANT HYSSOP	THR		PLANT
OPHIOGLOSSUM PUSILLUM	ADDER'S-TONGUE	SC		PLANT^
POTAMOGETON CONFERVOIDES	ALGAE-LIKE PONDWEED	THR		PLANT^
DIARRHENA AMERICANA	AMERICAN BEAKGRAIN	END		PLANT^
POA PALUDIGENA	BOG BLUEGRASS	THR		PLANT^
THELYPTERIS SIMULATA	BOG FERN	SC		PLANT^
CAREX CUMULATA	CLUSTERED SEDGE	SC		PLANT^
TRIGLOCHIN MARITIMUM	COMMON BOG ARROW-GRASS	SC		PLANT^
POLYGALA CRUCIATA	CROSSLEAF MILKWORT	SC		PLANT^
ELEOCHARIS ENGELMANNII	ENGELMANN SPIKE-RUSH	SC		PLANT^
ECHINODORUS ROSTRATUS	ERECT BURHEAD	SC		PLANT^
CAREX LUPULIFORMIS	FALSE HOP SEDGE	END		PLANT^
MYRIOPHYLLUM FARWELLII	FARWELL'S WATER-MILFOIL	SC		PLANT^
ELEOCHARIS COMPRESSA	FLAT-STEMMED SPIKE-RUSH	SC		PLANT^
SCIRPUS GEORGIANUS	GEORGIA BULRUSH	SC		PLANT^
NAPAEA DIOICA	GLADE MALLOW	SC		PLANT^
JUNCUS MARGINATUS	GRASSLEAF RUSH	SC		PLANT^
UTRICULARIA GEMINISCAPA	HIDDEN-FRUITED BLADDERWORT	SC		PLANT^
CALLITRICHE HETEROPHYLLA	LARGE WATER-STARWORT	THR		PLANT^
GENTIANOPSIS PROCERA	LESSER FRINGED GENTIAN	SC		PLANT^
CAREX FOLLICULATA	LONG SEDGE	SC		PLANT^
ELATINE TRIANDRA	LONGSTEM WATER-WORT	SC		PLANT^
EPILOBIUM PALUSTRE	MARSH WILLOW-HERB	SC		PLANT^
POLYGALA INCARNATA	PINK MILKWORT	END		PLANT^
CERATOPHYLLUM ECHINATUM	PRICKLY HORNWORT	SC		PLANT^
SCLERIA RETICULARIS	RETICULATED NUTRUSH	END		PLANT^
CAREX SCHWEINITZII	SCHWEINITZ'S SEDGE	END		PLANT^
SALIX SERICEA	SILKY WILLOW	SC		PLANT^
SCIRPUS HETEROCHAETUS	SLENDER BULRUSH	SC		PLANT^
DROSER A LINEARIS	SLENDERLEAF SUNDEW	THR		PLANT^
CALAMAGROSTIS STRICTA	SLIM-STEM SMALL-REEDGRASS	SC		PLANT^
MYOSOTIS LAXA	SMALL FORGET-ME-NOT	SC		PLANT^
CAREX LAEVIVAGINATA	SMOOTH-SHEATH SEDGE	END		PLANT^
POTAMOGETON PULCHER	SPOTTED PONDWEED	END		PLANT^
CAREX STRAMINEA	STRAW SEDGE	SC		PLANT^
ARETHUSA BULBOSA	SWAMP-PINK	SC		PLANT^
PLATANUS OCCIDENTALIS	SYCAMORE	SC		PLANT^
DESCHAMPSIA CESPITOSA	TUFTED HAIRGRASS	SC		PLANT^

BARTONIA PANICULATA	TWINING SCREWSTEM	SC	PLANT^
JUNCUS VASEYI	VASEY RUSH	SC	PLANT^
POTAMOGETON VASEYI	VASEY'S PONDWEED	SC	PLANT^
RHEXIA VIRGINICA	VIRGINIA MEADOW-BEAUTY	SC	PLANT^
DIDIPLIS DIANDRA	WATER-PURSLANE	SC	PLANT^
POTAMOGETON DIVERSIFOLIUS	WATER-THREAD PONDWEED	SC	PLANT^
SCLERIA TRIGLOMERATA	WHIP NUTRUSH	SC	PLANT^
ELEOCHARIS WOLFII	WOLF SPIKERUSH	END	PLANT^
BARTONIA VIRGINICA	YELLOW SCREWSTEM	SC	PLANT^
NUPHAR ADVENA	YELLOW WATER LILY	SC	PLANT^
ECLIPTA ALBA	YERBA DE TAJO	SC	PLANT^
BEDROCK GLADE	BEDROCK GLADE	NA	COMMUNITY
CEDAR GLADE	CEDAR GLADE	NA	COMMUNITY
CENTRAL SANDS PINE-OAK FOREST	CENTRAL SANDS PINE-OAK FOREST	NA	COMMUNITY
DRY PRAIRIE	DRY PRAIRIE	NA	COMMUNITY
DRY-MESIC PRAIRIE	DRY-MESIC PRAIRIE	NA	COMMUNITY
FELSENMEER	GLACIERE TALUS	NA	COMMUNITY
HEMLOCK RELICT	HEMLOCK RELICT	NA	COMMUNITY
MESIC PRAIRIE	MESIC PRAIRIE	NA	COMMUNITY
MOIST CLIFF	MOIST CLIFF	NA	COMMUNITY
NORTHERN DRY FOREST	NORTHERN DRY FOREST	NA	COMMUNITY
NORTHERN DRY-MESIC FOREST	NORTHERN DRY-MESIC FOREST	NA	COMMUNITY
NORTHERN MESIC FOREST	NORTHERN MESIC FOREST	NA	COMMUNITY
OAK BARRENS	OAK BARRENS	NA	COMMUNITY
OAK OPENING	OAK OPENING	NA	COMMUNITY
PINE BARRENS	PINE BARRENS	NA	COMMUNITY
PINE RELICT	PINE RELICT	NA	COMMUNITY
SAND BARRENS	SAND BARRENS	NA	COMMUNITY
SAND MEADOW	SAND MEADOW	NA	COMMUNITY
SAND PRAIRIE	SAND PRAIRIE	NA	COMMUNITY
SOUTHERN DRY FOREST	SOUTHERN DRY FOREST	NA	COMMUNITY
SOUTHERN DRY-MESIC FOREST	SOUTHERN DRY-MESIC FOREST	NA	COMMUNITY
SOUTHERN MESIC FOREST	SOUTHERN MESIC FOREST	NA	COMMUNITY
ALDER THICKET	ALDER THICKET	NA	COMMUNITY^
CALCAREOUS FEN	CALCAREOUS FEN	NA	COMMUNITY^
CENTRAL POOR FEN	CENTRAL POOR FEN	NA	COMMUNITY^
COASTAL PLAIN MARSH	COASTAL PLAIN MARSH	NA	COMMUNITY^
EMERGENT AQUATIC	EMERGENT AQUATIC	NA	COMMUNITY^
EPHEMERAL POND	EPHEMERAL POND	NA	COMMUNITY^
FLOODPLAIN FOREST	FLOODPLAIN FOREST	NA	COMMUNITY^
FORESTED SEEP	FORESTED SEEP	NA	COMMUNITY^
HARDWOOD SWAMP	HARDWOOD SWAMP	NA	COMMUNITY^
LAKE--DEEP, HARD, SEEPAGE	LAKE--DEEP, HARD, SEEPAGE	NA	COMMUNITY^
LAKE--OXBOW	LAKE--OXBOW	NA	COMMUNITY^
LAKE--SHALLOW, SOFT, SEEPAGE	LAKE--SHALLOW, SOFT, SEEPAGE	NA	COMMUNITY^
NORTHERN SEDGE MEADOW	NORTHERN SEDGE MEADOW	NA	COMMUNITY^
NORTHERN WET FOREST	NORTHERN WET FOREST	NA	COMMUNITY^
OPEN BOG	OPEN BOG	NA	COMMUNITY^
SHRUB-CARR	SHRUB-CARR	NA	COMMUNITY^
SOUTHERN HARDWOOD SWAMP	SOUTHERN HARDWOOD SWAMP	NA	COMMUNITY^
SOUTHERN SEDGE MEADOW	SOUTHERN SEDGE MEADOW	NA	COMMUNITY^
SPRINGS AND SPRING RUNS, HARD	SPRINGS AND SPRING RUNS, HARD	NA	COMMUNITY^
SPRINGS AND SPRING RUNS, SOFT	SPRINGS AND SPRING RUNS, SOFT	NA	COMMUNITY^
STREAM--FAST, HARD, COLD	STREAM--FAST, HARD, COLD	NA	COMMUNITY^
STREAM--FAST, SOFT, COLD	STREAM--FAST, SOFT, COLD	NA	COMMUNITY^
STREAM--FAST, SOFT, WARM	STREAM--FAST, SOFT, WARM	NA	COMMUNITY^
STREAM--SLOW, HARD, WARM	STREAM--SLOW, HARD, WARM	NA	COMMUNITY^
STREAM--SLOW, SOFT, COLD	STREAM--SLOW, SOFT, COLD	NA	COMMUNITY^
STREAM--SLOW, SOFT, WARM	STREAM--SLOW, SOFT, WARM	NA	COMMUNITY^
TAMARACK SWAMP	TAMARACK SWAMP	NA	COMMUNITY^
WET PRAIRIE	WET PRAIRIE	NA	COMMUNITY^
WET-MESIC PRAIRIE	WET-MESIC PRAIRIE	NA	COMMUNITY^
WHITE PINE-RED MAPLE SWAMP	WHITE PINE-RED MAPLE SWAMP	NA	COMMUNITY^

APPENDIX F: NONPOINT SOURCE PRIORITY RANKINGS IN THE BASIN

<i>Watershed</i>	<i>Overall Rank</i>	<i>Stream Rank</i>	<i>Lake Rank</i>	<i>Groundwater Rank</i>	<i>Status</i>	<i>TMDL Sites Full/Partial</i>
Millville Creek (LW01)	NR	NR	NR	High		
Lower Kickapoo River (LW02)	High	High	NR	High		
Reeds and Tainter Creeks (LW03)	High	High	NR	High		
West Fork Kickapoo River (LW04)	High	High	NR	High		
Middle Kickapoo River (LW05)	High	NA	NA	High	Active (89-00)	
Upper Kickapoo River (LW06)	High	High	NR	High		
Green River and Crooked Creek (LW07)	High	High	NR	High		
Knapp Creek (LW08)	Med	Med	NR	High		
Blue River (LW09)	High	High	NR	High		
Mill and Indian Creeks (LW10)	High	High	Low	High		
Otter and Morrey Creeks (LW11)	High	NR	Low	High		Partial
Willow Creek (LW12)	High	High	Low	High		
Upper Pine River (LW13)	Med	Med	NR	High		
Bear Creek (LW14)	Med	Med	NR	High		
Mill and Blue Mounds Creek (LW15)	Med	Med	Low	High		
Honey Creek (LW16)	Med	Med	NR	High		
Black Earth Creek (LW17)	High	NA	NA	High	Closed	
Roxbury Creek (LW18) (Dunlap Creek)	High	NA	NA	High	Active (90-01)	
Lake Wisconsin (LW19)	Med	Med	Low	High		Partial
Duck and Rock Run Creeks (LW20)	Med	Med	Low	High		
Lower Baraboo River (LW21)	Med	NR	Low	High		
Narrows Creek and Baraboo River (LW22)	High	NA	NA	High	Active (89-00)	
Crossman Creek/Little Baraboo River (LW23)	High	NA	NA	High	Closed	
Seymour Creek/Upper Baraboo River (LW24) (Hillsboro Lake)	Med	Med	NR	High	Active	Partial
Duck Creek (LW25)	Low	Low	Low	High		
Dell Creek (LW26)	High	High	Med	High	Active	
Lower Lemonweir River (LW27)	Med	Med	Low	High		
Beaver Creek/Juneau (LW28)	NR	NR	Low	Low		
Little Lemonweir River (LW29) (Lake Tomah)	NR	NR	Low	High	Active (90-01)	Partial

- ◆ NR in the stream column indicates that data was available for less than 50% of streams.
- ◆ NR in the lake column indicates that there were no lakes or not enough lakes larger than 25 acres in the watershed.
- ◆ NR in the “Overall Rank” column indicates that the watershed has not been ranked.

APPENDIX G: PERMITTED POINT SOURCES (INDUSTRIAL) IN THE LOWER WISCONSIN RIVER BASIN

Facility	Watershed	County	Permit No. (Expires)	Receiving Water	Class	Design Flow (MGD)	Planning Area	Recommendations		
								Narrative	Toxics	Other
K&K Cheese	LW04	Vernon	55808 (02/9/31)	Groundwater	N/A	0.025				
Valley Pride Pack	LW06	Monroe	52931 (97/6/30)	Moore Cr.; Groundwater	WWSF; N/A	0.007				Revoke Permit
Milk Specialties	LW07	Grant	3107 (01/3/31)	Crooked Cr	WWSF		Boscobel			
Fennimore Branch Cheese	LW09	Grant	55450 (04/12/31)	Groundwater	N/A	0.006				Haul wastewater or construct new facility on new site
Hanor Company - Main Farm	LW10	Richland	56260 (01/3/31)	Groundwater	N/A					
Springdale Cheese	LW10	Richland	54208 (05/6/30)	Groundwater	N/A					
Arena Cheese	LW11	Iowa	52035 (05/6/30)	Groundwater	N/A	0.015	Arena			
Meister Cheese (Muscoda Protein)	LW11	Iowa	55069 (01/3/31)	Groundwater	N/A	0.08	Muscoda			
Foremost Farms	LW13	Richland	4413	Pine R.; Groundwater	WWSF; N/A	0.012	Richland Ctr.			
Hanor Company - Crouch Farm	LW14	Sauk	56374 (01/3/31)	Groundwater	N/A					
Pecks Feed & Grain	LW14	Sauk	56278 (00/9/30)	Groundwater	N/A					
Mill Creek Cheese	LW15	Iowa	55174 (04/9/30)	Groundwater	N/A	0.006				
Cedar Grove Cheese	LW16	Sauk	50245 (03/12/31)	Honey Creek	WWSF	0.006				
Maize N Bacon	LW16	Sauk	49042 (02/3/31)	Groundwater	N/A					
WCC Flats, Inc.	LW16	Sauk	58866 (05/3/31)	Groundwater	N/A					
Capitol Sand & Gravel	LW17	Dane	33286 (04/3/31)	Black Earth	COLD (ORW)	4.32		X		Monitoring near discharge
Lodi Canning	LW19	Columbia	2658 (02/3/31)	Spring Cr; Groundwater	WWSF; N/A	0.04	Lodi			
U.S. Army Badger Ammo	LW19	Sauk	43974 (00/12/31)	Wisconsin R.; Groundwater	WWSF; N/A	0.5	Sauk-Prairie	X		

Facility	Watershed	County	Permit No. (Expires)	Receiving Water	Class	Design Flow (MGD)	Planning Area	Recommendations		
								Narrative	Toxics	Other
Chiquita Inc.	LW19	Columbia	44938 (01/3/31)	Groundwater	N/A		Poynette			
Chiquita Inc.	LW19	Columbia	55867 (01/3/31)	Hinkson Cr; Groundwater	COLD; N/A	0.005	Poynette			
Chiquita Processed Foods	LW20	Columbia	3891 (00/6/30)	Duck Creek	WWSF		Cambria		X	
Del Monte Foods	LW20	Columbia	26620 (00/12/31)	N. Br. Duck; Groundwater	WWSF; N/A		Cambria			
Winger Silage Stack	LW20	Columbia	61417 (05/9/30)	Groundwater	N/A					
Alliant/WI Power & Light	LW20	Columbia	2780 (03/6/30)	Wisconsin R.; Rocky Run	WWSF; WWSF	2.39	Portage			
Grande Cheese Wycocena	LW20	Columbia	51764 (03/9/30)	Duck Creek; Groundwater	WWSF; N/A	0.012	Wycocena			
Unimin	LW20	Columbia	47422 (04/9/30)	Duck Creek	WWSF	2.4	Portage			
Teel Plastics	LW21	Sauk	4421 (02/6/30)	Baraboo R.	WWSF	0.201	Baraboo			
Foremost Farms	LW22	Sauk	35 (05/3/31)	Baraboo R.	WWSF		Reedsburg			
Lakeside Foods	LW23	Sauk	57738 (02/6/30)	Baraboo R.	WWSF		Reedsburg			
Saputo Cheese	LW23	Sauk	59404 (04/9/30)	Baraboo River	WWSF	0.12	Reedsburg			
Carr Valley	LW23	Sauk	51781 (05/12/31)	Groundwater	N/A					Currently Requires Groundwater Monitoring
Dells Boat Co.	LW25	Adams	60674 (88/6/30)	Groundwater	N/A	0.004	Wisconsin Dells			
Dells Boat Co. Witches Gulch	LW25	Adams	60682 (04/9/30)	Groundwater	N/A	0.004	Wisconsin Dells			
Chula Vista Resort	LW25	Adams	31585 (04/12/31)	Wisconsin R.	WWSF	0.06	Wisconsin Dells			
Arrowhead Resort	LW26	Juneau	31909 (04/12/31)	Groundwater	N/A	0.026	Wisconsin Dells			
Crocketts Resort	LW27	Juneau	61263 (04/6/30)	Wisconsin R.	WWSF	0.048				
Ocean Spray Cranberries, Inc.	LW28	Monroe	56057 (03/6/30)	Groundwater	N/A	0.115	Tomah			
Hustler Coop Creamery	LW29	Juneau	54038 (04/6/30)	Groundwater	N/A	0.02	Hustler			

APPENDIX G: PERMITTED POINT SOURCES (MUNICIPAL) IN THE LOWER WISCONSIN RIVER BASIN

Treatment Facility	Watershed	Permit No. (Expires)	Receiving Water	Class	Q 7 10 (cfs)	Design Flow (MGD)	Treatment Required	Recommendations			
								Monitor	Toxics	Facility Plan	Other
Eastman	LW02	36765 (02/9/30)	Pine Creek	COLD	3.7	0.05	SEC				
Gays Mills	LW02	22268 (05/6/30)	Kickapoo R.	WWSF	156	0.087	SEC				
Wauzeka	LW02	22276 (04/9/30)	Kickapoo R.	WWSF	190	0.08	SEC				Plant evaluation needed
Readstown	LW03	21661 (04/3/31)	Kickapoo R.	WWSF	63	0.07	SEC				
Soldiers Grove	LW03	22241 (04/9/30)	Kickapoo R.	WWSF	135	0.114	SEC				
LaFarge	LW05	24465 (03/3/31)	Kickapoo R.	WWSF	63	0.17	SEC				
Ontario	LW05	20753 (01/6/30)	Kickapoo R.	WWSF	21	0.086	SEC			X	Facility Plan Needed
Viola	LW05	21148 (02/6/30)	Kickapoo R.	WWSF	76	0.1	SEC				Need to dredge ponds
Wilton	LW06	22462 (04/9/30)	Kickapoo R.	WWSF	4.8	0.089	SEC				
Norwalk	LW06	24961 (01/3/31)	Moore Cr.	WWSF	1.8	0.138	WLA			X	Facility Plan Needed
Norwalk-Ontario Schools	LW06	60054 (03/9/30)	Groundwater	N/A	N/A	7000	LD			X	Facility Plan Recommended
Boscobel	LW07	22110 (99/6/30)	Wisconsin R.	WWSF (ERW)	2680	0.474	SEC+P				
Blue River	LW09	23418 (07/3/31)	Blue R.	WWSF	52	0.42	SEC				
Highland	LW09	36790 (03/12/31)	Big Spring Branch of Blue River	LFF	<0.01	0.12	INT	x			
Montfort	LW09	24821 (05/6/30)	Blue R.	COLD	4	0.105	WQB				
Muscoda	LW09	60615 (05/9/30)	Groundwater	N/A	N/A	0.216	LD				
Boaz	LW10	36749 (03/6/30)	Mill Creek	FAL	14	0.015	SEC				
Avoca	LW11	60151 (06/3/31)	Morrey Creek	WWFF	1.4	0.064	WQB				

Treatment Facility	Watershed	Permit No. (Expires)	Receiving Water	Class	Q 7 10 (cfs)	Design Flow (MGD)	Treatment Required	Recommendations			
								Monitor	Toxics	Facility Plan	Other
Sextonville S.D.	LW12	60038 (03/6/30)	Willow Creek	WWSF	28	0.0627	SEC				
Hub City/Rockbridge SD	LW13	49689 (03/9/30)	Pine River	COLD	29	0.0256	SEC				
Richland Center	LW12	20109 (05/3/31)	Pine River	WWSF	66	1.6	SEC+P				
Lone Rock	LW14	60763 (03/12/31)	Groundwater	N/A	N/A	0.057	LD	X			
Spring Green G.C.S.D.	LW15	28363 (04/3/31)	Trib. To Lowery Cr.	LAL	0	0.089	MARG				
Plain	LW16	36048 (05/12/31)	Trib. to Honey Cr.	LFF	0	0.105	INT				
Sauk-Prairie Sewerage Commission	LW16	60534 (06/9/30)	Groundwater	N/A	N/A	0.822	LD				
Spring Green	LW14	60801 (03/9/30)	Wisconsin R.	WWSF	2,400	0.26	SEC+P				
Cross Plains	LW17	20788 (04/9/30)	Black Earth Cr.	COLD (ERW)	4.6	0.45	WLA + P				
Dane/Iowa Sewerage Commission	LW17	49816 (05/3/31)	Black Earth Cr.	WWSF	17	0.691	WLA + P				
Brylee Crop. (Crystal Lake Campground)	LW18	61093 (04/12/31)	Groundwater	N/A	N/A	0.01	LD				
Roxbury S.D.	LW18	28975 (06/9/30)	Roxbury Cr.	LFF	<0.01	0.0256	INT				
Devils Head Lodge	LW19	60968 (02/9/30)	Groundwater	N/A	N/A	0.055	LD				Construct new WWTP
Harmony Grove Okee	LW19	35459 (04/6/30)	Groundwater	N/A	N/A	0.213	LD				Upgrade WWTP
Lodi	LW19	22918 (05/9/30)	Spring Cr.	COLD	15	0.62	SEC				
Merrimac	LW19	61042 (03/6/30)	Groundwater	N/A	N/A	0.05	LD				Construct new WWTP

Treatment Facility	Watershed	Permit No. (Expires)	Receiving Water	Class	Q 7 10 (cfs)	Design Flow (MGD)	Treatment Required	Recommendations			
								Monitor	Toxics	Facility Plan	Other
Poynette	LW19	21091 (04/6/30)	Rowan Cr.	COLD	3	0.465	WLA+P				
Selwood Farm POA	LW19	61654 (06/6/30)	Groundwater	N/A	N/A	0.021	LD				
Cambria	LW20	23523 (05/12/31)	N. Br. Duck Cr.	WWSF	<20.01	0.127	WLA				
Rio	LW20	20117 (05/6/30)	Trib. to Rocky Run	LAL	0	0.115	MARG				
Wyocena	LW20	60950 (03/9/30)	Groundwater	N/A	N/A	0.122	LD				
Goetz Companies, Inc. - Portage	LW21	35998 (03/6/30)	Baraboo R.	FAL	87	0.041	SEC				
Portage	LW21	20427 (03/12/31)	Wisconsin R.	WWSF	1790	2	SEC+P				
Baraboo	LW21	20605 (06/12/31)	Baraboo R.	WWSF	87	2.39	SEC+P				
Ho-Chunk Nation	LW21	49824 (05/9/30)	Groundwater	N/A	N/A	0.229	LD				
J&L Oil	LW21	30775 (05/9/30)	Groundwater	N/A	N/A	0.03	LD				
Hillpoint S.D.	LW22	35483 (03/3/31)	Hillpoint Cr.	WWSF	0.62	0.011	WLA				
Lime Ridge	LW22	36447 (04/3/31)	Narrows Creek	WWSF	0.2	0.015	SEC				
Loganville	LW22	29114 (04/12/31)	Narrows Cr.	WWSF	2.6	0.045	SEC				
North Freedom	LW22	28011 (05/6/30)	Baraboo R.	WWSF	84	0.07	SEC				
Reedsburg	LW22	20371 (04/6/30)	Baraboo R.	WWSF	50	1.8	SEC+P			X	Facility Plan
Rock Springs	LW22	29041 (02/12/31)	Baraboo R.	WWSF	50	0.077	SEC				
Sauk Co. Health Care	LW22	30929 (04/3/31)	Trib. to Narrows	LFF	0.6	0.042	SEC				
Cazenovia	LW23	31801 (03/6/30)	Little Baraboo R.	WWSF	6.4	0.035	SEC	x			
LaValle	LW23	28878 (02/9/30)	Baraboo R.	WWSF	29	0.057	SEC				

Treatment Facility	Watershed	Permit No. (Expires)	Receiving Water	Class	Q 7 10 (cfs)	Design Flow (MGD)	Treatment Required	Recommendations			
								Monitor	Toxics	Facility Plan	Other
Elroy	LW24	23931 (02/3/31)	Baraboo R.	WWSF	9.1	0.33	WLA				
Hillsboro	LW24	20583 (03/12/31)	W. Br. Baraboo	WWSF	3.1	0.5	WLA				
Kendall	LW24	20516 (03/6/30)	Baraboo R.	COLD	1.7	0.07	SEC				
Union Center	LW24	25640 (05/6/30)	Baraboo R.	WWSF	15	0.158	SEC				
Wonegoc	LW24	29688 (02/6/30)	Baraboo R.	WWSF	21	0.142	SEC				
Wisconsin Dells Lake Delton	LW25	31402 (03/6/30)	Wisconsin R.	WWSF	1790	2.83	SEC+P			X	Facility Plan
Lyndon Station	LW26	60488 (05/3/31)	Lyndon Creek	COLD	0.93	0.06					
Christmas Mt. SD	LW26	36064 (03/6/30)	Groundwater	N/A	N/A	0.142	LD				
Pleasant Acres Nursing Home	LW27	Will Close in 11/01	Trib. to Webster Cr.	LAL	0	0.02	MARG				
Mauston	LW27	24635 (04/6/30)	Lemonweir	WWSF	60	1	SEC				
New Lisbon	LW27	20699 (04/3/31)	Lemonweir R. (via Trib)	WWSF	56	0.48	SEC				
Warrens	LW28	60259 (03/9/30)	Groundwater	N/A	N/A	0.045	LD				
Tomah	LW29	21318 (05/12/31)	S. Fork Lemonweir	WWSF	5.1	2.27	WLA				
Wyeville	LW29	36617 (04/6/30)	Groundwater	N/A	N/A		LD			x	Facility Plan needed
Oakdale S.D.	LW29	31259 (05/3/31)	Trib. to Allen Cr.	LAL	0	0.075	MARG				
Hustler	LW29	32085 (03/3/31)	Little Lemonweir	COLD	4	0.016	SEC				
Volk Field WANG	LW29	23078 (04/9/30)	Lemonweir	WWSF	44	0.2	SEC				

APPENDIX H: WATERBODIES TESTED FOR CONTAMINANTS IN THE LOWER WISCONSIN RIVER BASIN

<i>Waterbody</i>	<i>Extent of Monitoring</i>	<i>Fish Species Tested¹</i>
Baraboo River	Above La Valle	LB, NP, CP
Baraboo River	Downstream of Hwy. 113	SB, NP, CP
Baraboo River	At North Freedom	CP
Baraboo River	At Reedsburg	YP, CP
Black Earth Creek	Below Cross Plains	BT
Blackhawk Lake	Entire Lake	WS, LB, WE
Columbia Lake	Entire Lake	GS, HB, CC
Crystal Lake	Entire Lake	LB
Decorah Lake	Entire Lake	BG, LB, NP
Devils Lake	Entire Lake	WE, LB, NP, BC, BG
Dutch Hollow Lake	Entire Lake	WE, LB, NP, BG
Field Veterans Memorial Lake	Entire Lake	LB
Fish Lake	Entire Lake	NP, LB, BG
Kickapoo River	Above Gays Mills Dam	CP
Kickapoo River	At La Farge	NP, BT, WS,
Kickapoo River	At Steuben	SG, WS, CP, NR, NP, WE, SB, CC
Lake Delton	Entire Lake	YB, WE, NP, BG, BC, LB
Lemonweir River	Lower Area	CC
Lemonweir River	New Lisbon Flowage	LB, WE, CP, BG, BC
Lemonweir River	Olson Brothers Reservoir	BB, YP, BG, LB, NP
Mirror Lake	Entire Lake	NP, BG, BC, WE, LB
Pine River	At Richland Center	CP
Redstone Lake	Entire Lake	LB, CP, WE
Wisconsin River	Below Castle Rock Dam	SB, WE, NP, CP
Wisconsin River	Below Prairie du Sac Dam	PF, CC, WE, CP² , LS³
Wisconsin River	Below Wisconsin Dells	SB, WE, CP
Wisconsin River	At Boscobel	CP, NP, SG, WE, LB, CC, SB

<i>Waterbody</i>	<i>Extent of Monitoring</i>	<i>Fish Species Tested²</i>
Wisconsin River	Lake Wisconsin	NP, SG, CP¹ , BG, PS, LS⁵ , WE, BC, BG, YP, WS, BM, LB, WC, SB, FD, WB
Wisconsin River	At Spring Green	SB
Wisconsin River	At Wisconsin Dells	WE, QB, CP, SB

¹ Fish tested for Mercury and PCB Contamination:

BB - Black Bullhead	CP - Carp	NP - Northern Pike	SG - Sauger
BC - Black Crappie	FD - Freshwater Drum	NR - Northern Redhorse	WB - White Bass
BG - Bluegill	GS - Gizzard Shad	PF - Paddlefish	WE - Walleye
BM - Bigmouth Buffalo	HB - Hybrid Bass	PS - Pumpkinseed	WS - White Sucker
BT - Brown Trout	LB - Largemouth Bass	QB - Quillback	YB - Yellow Bass
CC - Channel Catfish	LS - Lake Sturgeon	SB - Smallmouth Bass	YP - Yellow Perch

² All groups (including children, women of childbearing years and men) should eat no more than one meal per month of carp greater than 20 inches from this section of the Wisconsin River – PCB Special Advisory.

³ All groups (including children, women of childbearing years and men) should eat no more than six meals per year of Lake Sturgeon from this section of the Wisconsin River – PCB Special Advisory.

⁴ All groups (including children, women of childbearing years and men) should eat no more than one meal per month of carp from this section of the Wisconsin River – PCB Special Advisory.

⁵ All groups (including children, women of childbearing years and men) should eat no more than six meals per year of Lake Sturgeon ***less than 54 inches*** from this section of the Wisconsin River. ***Do not eat*** Lake Sturgeon greater than 54 inches from this section of the Wisconsin River – PCB Special Advisory.

APPENDIX I: RESULTS OF FEDERAL AND STATE WILDLIFE SURVEYS IN THE LOWER WISCONSIN RIVER BASIN

Composite list of bird species found on Federal Breeding Bird Survey routes 52, 55, 316 and 317 in the Lower Wisconsin River Basin.

American Bittern ^{SC}	Yellow-shafted Flicker	Cedar Waxwing
Great Blue Heron ^{SC}	Pileated Woodpecker	Blue-winged Warbler
Great Egret ST	Olive-sided Flycatcher	Golden-winged Warbler ^{SC}
Green Heron	Eastern Wood-Pewee	Yellow Warbler
Turkey Vulture	Acadian Flycatcher ST	Chestnut-sided Warbler
Canada Goose	Willow Flycatcher	Prairie Warbler
Wood Duck	Least Flycatcher	Cerulean Warbler ST
Mallard	Eastern Phoebe	Black-and-white Warbler
Blue-winged Teal ^{SC}	Great Crested Flycatcher	American Redstart
Northern Harrier ^{SC}	Eastern Kingbird ^{SC}	Ovenbird
Sharp-shinned Hawk	Loggerhead Shrike ^{SE}	Mourning Warbler
Cooper's Hawk ^{SC}	Bell's Vireo ST	Common Yellowthroat
Red-tailed Hawk	Yellow-throated Vireo	Hooded Warbler ST
American Kestrel	Warbling Vireo	Scarlet Tanager
Gray Partridge	Red-eyed Vireo	Eastern Towhee
Ring-necked Pheasant	Blue Jay	Chipping Sparrow
Ruffed Grouse	American Crow	Clay-colored Sparrow
Wild Turkey	Horned Lark	Field Sparrow ^{SC}
Northern Bobwhite	Purple Martin ^{SC}	Vesper Sparrow ^{SC}
Sandhill Crane	Tree Swallow	Lark Sparrow ^{SC}
Killdeer	N. Rough-winged Swallow	Savannah Sparrow
Spotted Sandpiper	Bank Swallow	Grasshopper Sparrow ^{SC}
Upland Sandpiper ^{SC}	Cliff Swallow	Henslow's Sparrow ST
Common Snipe	Barn Swallow	Song Sparrow
Rock Dove	Black-capped Chickadee	Swamp Sparrow
Mourning Dove	Tufted Titmouse	Northern Cardinal
Black-billed Cuckoo	Red-breasted Nuthatch	Rose-breasted Grosbeak
Yellow-billed Cuckoo ^{SC}	White-breasted Nuthatch	Indigo Bunting
Great Horned Owl	House Wren	Dickcissel ^{SC}
Barred Owl	Winter Wren	Bobolink ^{SC}
Common Nighthawk	Sedge Wren ^{SC}	Red-winged Blackbird
Whip-poor-will	Marsh Wren	Eastern Meadowlark ^{SC}
Chimney Swift	Blue-gray Gnatcatcher	Western Meadowlark ^{SC}
Ruby-throated Hummingbird	Eastern Bluebird	Common Grackle
Belted Kingfisher	Veery ^{SC}	Brown-headed Cowbird
Red-headed Woodpecker ^{SC}	Wood Thrush ^{SC}	Orchard Oriole ^{SC}
Red-bellied Woodpecker	American Robin	Baltimore Oriole
Yellow-bellied Sapsucker	Gray Catbird	House Finch
Downy Woodpecker	Brown Thrasher	American Goldfinch
Hairy Woodpecker	European Starling	House Sparrow

Status: SE - State Endangered; ST - State Threatened; SC – Special Concern (Those species about which some problem of abundance or distribution is suspected but not yet proved)

Reptiles and amphibians of the Lower Wisconsin River Basin Based on the Wisconsin Herp Atlas Project Data

Blue-spotted Salamander	Oachita Map Turtle
Easter Tiger Salamander	Midland Smooth Softshell ^{SC}
Central Newt	Spiny Softshell Turtle
Four-toed Salamander ^{SC}	Western Slender Glass Lizard ^{SE}
Mudpuppy	Prairie Racerunner
American Toad	Five-lined Skink
Blanchard's Cricket Frog ^{SE}	Ringneck Snake
Chorus Frog	Prairie Ringneck Snake ^{SC}
Spring Peeper	Eastern Hognose Snake
Eastern Gray Tree Frog	Smooth Green Snake
Copes Gray Tree Frog	Yellow-Bellied Racer ^{SC}
Bull Frog ^{SC}	Black Rat Snake ^{SC}
Green Frog	Western Fox Snake
Pickerel Frog ^{SC}	Bullsnake ^{SC}
Leopard Frog	Eastern Milk Snake
Wood Frog	Plains Garter Snake
Snapping Turtle	W. Ribbon Snake ^{SE}
Musk Turtle	N. Ribbon Snake ^{SE}
Blanding's Turtle ST	Common Garter Snake
Ornate Box Turtle ^{SE}	Brown Snake
Wood Turtle ST	Northern Redbelly Snake
Painted Turtle	Northern Water Snake
Common Map Turtle	Timber Rattlesnake ^{SC}
False Map Turtle ^{SC}	

Status: SE - State Endangered; ST - State Threatened; SC - Special Concern

Wisconsin Frog and Toad Survey Results for the Lower Wisconsin River Basin

Species	Driftless Area Ecoregion Population Trend
American Toad	Stable
Bull Frog	Stable
Eastern Gray Treefrog	Increasing***
Green Frog	Increasing*
Chorus Frog	Stable
Cope's Gray Treefrog	Increasing*
Spring Peeper	Increasing**
Wood Frog	Stable
Leopard Frog	Stable
Pickerel Frog	Declining**
Blanchard's Cricket Frog	Stable

Increasing – Three Population indices show positive trends.

Stable - Three population indices show both positive and negative trends and/or no indices are statistically significant when $P=0.05$

Declining - All three population indices show negative trends.

* - One of three population indices was statistically significant when $P=0.05$.

** - Two of three population indices were statistically significant when $P=0.05$.

*** - All three population indices were statistically significant when $P=0.05$

APPENDIX J: HOW TO READ THE STREAM TABLES

The following information is included in the stream tables, which are found in the individual watershed narratives. Unknowns, (U), in the tables indicate that we have insufficient data to assess that variable for a given stream(s). In the future we hope to provide data on these unassessed waterbodies.

Name of Stream: All named streams and some unnamed streams are listed. Stream names are those found on U.S. Geological Survey (USGS) quadrangle maps unless the Wisconsin Geographic Names Council has established a different name. Unnamed streams are identified by location of the stream mouth as indicated by township, range, and section.

Waterbody Identification Code (WBIC): All waterbodies have been assigned a waterbody identification code by the state to help in identifying streams and stream locations.

Length: The stream length is either the total length of the stream, or the starting and ending mile of the portion of the stream with a specific classification or biological use. The stream mile at the stream mouth is zero ("0") and increases as one moves upstream.

Existing Use: This column indicates the biological use that the stream or stream segment currently supports as determined through recent surveys and/or through the professional judgment of WDNR Personnel. A "U" indicates that the existing use is unknown.

This is not a designation or classification; it is based on the current condition of the surface water and the biological community living in that surface water. Information in this column is not designed for, and should not be used for, regulatory purposes.

The existing uses are taken from the biological use categories listed below. These categories are defined in NR102(04)(3) under fish and aquatic life uses, and are the same categories used to describe the stream's codified use.

COLD Cold Water Community; includes surface waters that are capable of supporting a community of cold water fish and other aquatic life or that serve as a spawning area for cold water fish species.

COLD I high quality stream where populations are sustained by natural reproduction.

COLD II stream has some natural reproduction but may need stocking to maintain a desirable fishery.

COLD III stream has no natural reproduction and requires annual stocking of legal-size fish to provide sport fishing.

WWSF Warm Water Sport Fish Communities; includes waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish.

WWFF Warm Water Forage Fish Communities; includes surface waters capable of supporting an abundant, diverse community of forage fish and other aquatic life.

LFF Limited Forage Fishery (intermediate surface waters); includes surface waters of limited capacity due to low flow, naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of tolerant forage fish and aquatic life.

LAL Limited Aquatic Life (marginal surface waters); includes surface waters severely limited because of low flow and naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of aquatic life.

Potential Use: This column indicates the biological use that the investigator believes the stream or stream segment could achieve through proper management of "controllable" pollution sources. Beaver dams, hydroelectric dams, low gradient streams, and naturally occurring low flows can not generally be controlled.

The potential use may be the same as the existing use or it may be higher. Abbreviations for "potential use" are the same as those used in the "existing use" column.

Supporting Potential Use: This column indicates whether a stream is threatened, or is fully, partially, or not meeting its potential biological use. An entry in this column shows the relationship between the stream's existing and potential biological use.

Fully Supporting "Full"

A stream or stream segment's existing biological use is the same as its potential biological use ($E = P$). This includes stream or stream segments that are *not affected* and stream or stream segments that have *culturally irreversible* impacts. An example of culturally irreversible impacts are those effects in a river system with an "optimally operating" dam--a dam that operates with minimal to no effect on the fish and aquatic life community assemblage, productivity, and diversity.

Fully Supporting/Threatened "Full-thr"

A stream or stream segment's existing biological use is the same as its potential biological use ($E = P$), but there is a *clear and imminent* "threat" to the existing use remaining at its current level of biological productivity and ecological health. This threat could be due to actions likely to occur on or to the stream and/or in the watershed, such as:

1. Rapid commercial, residential, and/or industrial development in the watershed,
2. The advent of large-scale industrial operations in the watershed,
3. Planned or active channel modifications that have been, or will be permitted, or cannot be regulated under existing state or federal rules (i.e., drainage districts).

Partially Supporting "Part"

A stream or stream segment's existing biological use is the same as its potential biological use, except that implementation of management practices could enhance the overall ecological health of the biological community. Management practices in this category include modification of hydro-regimes to reduce the impact of dam operations on the biological community.

Thus, $E = P$, but the potential use assessment is below the stream or stream segment's maximum biological potential and this "less than optimal" condition is reversible.

Not Supporting "Not"

When a stream or stream segment's existing biological use is less than its potential biological use by a factor of 1 or more of the following codified use classifications: WWSF, WWFF, LFF, LAL, and Cold (includes Cold I, II, and III in one group). Thus, $E < P$, with problems considered reversible by implementation of management actions.

Codified Use and Trout Stream Classification: This is the waterbody's classification that is formally and legally recognized by NR102 and 104, Wis. Adm. Code. This column shows the classification that will be used to determine water quality criteria and effluent limits. A stream can obtain a codified use by applying formal stream classification procedures. Classifications listed in this column are derived from:

1. Streams classified and listed in NR102 and NR104. (*All waters not officially codified in NR102 or NR104 will be codified Warm Water Sport Fishery (WWSF) which is the default (DEF) classification and listed as "DEF."*)
2. Streams formally classified during the WPDES permitting process. These streams are surveyed and classified to provide the basis for the permit's effluent discharge limitations.
3. Trout streams as defined by *Wisconsin Trout Streams* (1980) and listed in NR 104. (This publication has been recently revised – see *Proposed Codified Use*).
4. ORW and ERW streams officially approved as such by the DNR board and listed in NR102.10 and NR102.11. Officially, ORW/ERW waterbodies are not fish and aquatic life use designations but are a separate category for the WDNR antidegradation program. These waterbodies also receive a fish and aquatic life use classification for the purpose of determining water quality criteria and/or effluent discharge limitations. See description of ORW and ERW below.

Outstanding Resource Waters, have excellent water quality and high-quality fisheries. They do not receive wastewater discharges; these point source discharges will not be allowed in the future unless the quality of such discharges meets or exceeds the quality of the receiving water. This classification includes national and state wild and scenic rivers and the highest quality Class I trout streams.

Exceptional Resource Waters have excellent water quality and valued fisheries but may already receive wastewater discharges or may receive future discharges necessary to correct environmental or public health problems. All COLD I streams are ERW's, but not all ERW's are COLD I streams.

Proposed Codified Use: The Wisconsin DNR publication, Wisconsin Trout Streams has recently been revised (PUB-FH-806 2002). Changes made in this publication will be recognized during the next revision of Administrative Code NR 102. These revisions will update the codified use of many streams in the basin. This column serves to indicate the streams that may be affected by these revisions. This column does not mean that these changes will necessarily be in effect, only that they may be. Therefore, this column should not be used for regulatory purposes. To find out if the codified use of these streams has been changed, please see the revised version of the Wisconsin Trout Streams book and the revised text of NR 102.

303(d) Status: This column states whether a stream or stream segment is currently on the 303(d) list of impaired waterbodies or should be added to the list. Streams or segments on this list have failed to meet one or more water quality standards and are considered “impaired.”

Rare Aquatic Species: This column identifies those streams in which a species on the state endangered, threatened, or species of concern list has been found. These species can be a species that resides in the stream, such as a fish, or one that is associated with aquatic systems, including turtles, insects, etc. A “Y” in the column indicates that one of these species has been found in or near the stream.

Use Impairments – Sources and Impacts: This column indicates probable sources of pollution in the stream and types of water quality problems present (impact). Often more detail is provided in the narrative. Unless otherwise shown, the sources and impacts are generalized for the entire stream. Following is a key to abbreviations in the stream tables:

Source (cause of problem). This is the source of threat or impairment.

ACC - No or limited access	LF – Landfill
BDAM - Beaver dam	MS - Mine wastes and/or roaster piles
BY - Barnyard or exercise lot runoff	NMM - Non-metallic mining
CE - Construction site erosion	NPS - Unspecified nonpoint sources
CL - Cropland erosion	PSB - Streambank pasturing
CM - Cranberry marsh	PSI - Point source, industrial discharge
DEV - Intense development pressure	PSM - municipal treatment plant discharge – point
DRDG - Dredging	PWL - Woodlot pasturing
EX - Introduced species	RS - Roadside erosion
F - Forestry (logging and roads, stream crossings)	SB - Streambank erosion
HM - Hydrological modification (dam, ditching, wetland drainage)	URB - Urban storm water runoff

Impact (effect or impact of source on a stream) Various known as the cause, impact or stressor, this column lists the effect on the stream as a result of the source.

AD - Animal deformity

BAC - Bacteriological contamination

CL - Chlorine toxicity

COM - Competition (i.e., encroachment by introduced species)

DO - Dissolved oxygen

FAD - Fish advisory

FLOW - Stream flow fluctuations caused by unnatural conditions

HAB - Habitat (in-stream sedimentation, scouring, etc.)

HM - Heavy metal toxicity

MAC - Undesirable rooted aquatic plant (macrophyte) or algal growth

MIG - Fish migration interference

NH₃ - Ammonia toxicity

NUT - Nutrient enrichment

ORG - Organic chemical toxicity/bioaccumulation

PCB - PCB bioaccumulation

pH - pH (fluctuations or extreme high or low)

PST - Pesticide/herbicide toxicity

SC - Sediment contamination

TEMP - Temperature (fluctuations or extreme high or low)

TOX - General toxicity problems

TURB - Turbidity

NPS Rank: This column indicates a stream's individual nonpoint source rank. The score is derived from a variety of factors.

High: A stream receives a high ranking if the stream has the potential to positively respond and/or be protected in nonpoint source controls are implemented and meets one of the following criteria:

1. The stream provides a unique environment for an endangered or threatened species;
2. The fish population and diversity is less than optimal due to water quality and/or habitat degradation;
3. The stream experiences recurring fishkills, or one of the following on a widespread and habitual basis; dissolved oxygen violations, ammonia standard violations, high nitrate levels, toxicity due to pesticides or other NPS toxicants, high levels of suspended solids;
4. The Hilsenhoff Biotic Index or Family Biotic Index rated poor or very poor.
5. The stream has a high rate of streambed sedimentation or accelerated negative physical changes to stream morphology occurring;
6. There is there a predominance of undesirable vegetation (algae or macrophytes);
7. The stream is a medium-ranked stream and a threatened ORW or ERW; **OR**
8. The stream is considered threatened based upon data.

Medium: A medium rating is given to streams with one of the following:

1. Fish populations of intermediate abundance or diversity;
2. Occasional water quality standard violations or consistent borderline readings;
3. Hilsenhoff Biotic Index of fair to fairly poor;
4. Lesser but still greater than optimal levels of stream sedimentation;
5. Lesser but still greater than optimal abundance of undesirable vegetation.
6. If a low-ranked stream is a threatened ORW or ERW

Low: If the stream does not have the potential to positively respond and/or be protected even if nonpoint source pollution controls are implemented.

PWP: This stream is a part of a Priority Watershed Project.

Monitored, Evaluated, or Unassessed: This column states generally whether a stream has been assessed. It does not indicate which stream segments have been monitored or evaluated. The terms *monitored, evaluated or unassessed* are defined as the following:

Monitored: A stream has been "monitored" for the purposes of Wisconsin water quality management plans and/or Wisconsin's Water Quality Assessment Report to Congress (305[b]). This data is site-specific data collected in the past five years and is used to determine the quality or integrity of the resource.

Evaluated: A stream has been "evaluated" if information other than site-specific data has been collected. Sources of "evaluated" information may include:

1. Site-specific data that is more than five years old,
2. Information on file provided by the public or others,
3. Best professional judgment of a WDNR biologist or a WDNR fish manager.

Unassessed: A stream has been not been assessed.

Data Level: This column indicates what level of chemical, biological and habitat data has been collected for the stream. The data in this column does not refer to a specific segment of the stream, but rather gives a general idea of what level of surveying has been done on the stream.

Bioassessments:

BI: Visual observations of biota, limited monitoring and extrapolations from other sites – unknown or low precision and sensitivity – professional biologist not required.

B2: One assemblage required with reference conditions of available, biotic index or narrative evaluation of historical records; limited to single sampling and site specific studies; low to moderate precision and sensitivity, professional biologist may provide oversight.

B3: Single assemblage, reference condition preferred; biotic index used or supplemented by historical records. Monitoring targeted sites during a single season; may be site specific study but may include spatial coverage for watershed level assessments. Moderate precision and sensitivity; professional biologist performs survey or training for sampling and assessment.

B4: generally two assemblages, may be one if data quality high. Regional reference conditions use; biotic index used. Monitoring over 1 –2 sampling seasons; broad coverage of sites for site specific or watershed specific assessments; use of probabilistic design. High precision and sensitivity; professional biologist surveys and assesses.

Habitat:

H1: Visual observation of habitat characteristics; no true assessment; documentation or readily discernible land use characteristics that might alter habitat quality, no reference conditions.

H2: Visual observation of habitat characteristics and simple assessment; use of land use maps for characterizing watershed condition; reference condition preestablished by professional scientist.

H3: Visual-based habitat assessment using SOPs; may be supplemented with quantitative measurements of selected parameters; conducted with bioassessment; data on land use compiled and used to supplement assessment; reference condition used as a basis for assessment.

Toxicological Approaches:

T1: Any one of the following: Acute or chronic WET, Acute ambient, or acute sediment

T2: Any of the following: Acute or chronic ambient, acute sediment, acute and chronic WET for effluent dominated stream

T3: chronic ambient or acute or chronic sediment, acute and chronic WET for effluent dominated stream

T4: Both of the following: acute and chronic ambient and acute or chronic sediment

Physical/Chemical

P1: any one of the following: water quality with grab sample or water data extrapolated from upstream or downstream, monitoring data more than five years old, BPJ based on land use data, etc.

P2: Any one of the following: water quality with grab sample or rotating basin surveys with multiple visits or automatic sampling synthesis of existing or historical information on fish contaminant levels, screening models based on loading data (not calibrated or verified)

P3: Any one of the following, composite or a series of grab water samples (diurnal coverage as appropriate), calibrated models

P4: All of the following: water quality monitoring used composite or series of grabs, limited sediment quality samples and fish tissue analyses at sites with high probability of contamination

Trend: This column can be based upon best professional judgment, or by comparing data from past plans to find that a waterbody has improved over previous assessments, or declined. This decline/improvement should not be the result of gaining data, but a relative assessment of changes occurring on the waterbody. The stream may be improving (I), stable (S), declining (D) or unknown (U).

APPENDIX K: HOW TO READ THE LAKE TABLES

The following explains the information used in the Lake Tables, which are found in the individual watershed narratives. *Note: A blank space anywhere in the table means that data is unassessed or unavailable.*

Name of Lake: All named and unnamed lakes are listed. Lake names are those found on U.S. Geological Survey quadrangle maps unless the Wisconsin Geographic Names Council has established a different name. Some lakes are known locally by other names; where available, local names have been listed with the official name.

Waterbody Identification Code (WBIC): All waterbodies have been assigned a waterbody identification code by the state to help in identifying streams and stream locations.

Watershed number: The watersheds are identified for each lake listed using the WDNR Master Waterbody File in conjunction with U.S. Geological Survey seven minute topographic maps.

County: Indicates the county in which the lake is located.

Surface area (acres): The surface area is the size of the lake, in acres, as listed on the WDNR Master Waterbody File and in the *Wisconsin Lakes* PUB-FH-800 2001.

Max Depth: Maximum depths are those listed in *Wisconsin Lakes*, WDNR PUBL-FH-800 2001.

Lake type: Each lake type displays unique limnological characteristics based on physical and chemical properties. Production of plant and animal life generally varies in accordance with lake type. Basic classifications and qualifying criteria are:

Drainage lake (DG): Impoundments and natural lakes with the main water source from stream drainage. These types of lakes have at least one inlet and one outlet.

Drained lake (DR): Natural lake with the main water source dependent on the groundwater table and seepage from adjoining wetlands. Seldom has an inlet but will have an outlet of very little flow similar to the seepage lake except for the outlet.

Seepage lake (SE): Landlocked. Water level maintained by groundwater table and basin seal. Intermittent outlet may be present.

Spring lake (SP): Seldom has an inlet, but always has an outlet of substantial flow. Water supply is dependent upon groundwater rather than surface drainage.

Winterkill: Winterkill (winter oxygen depletion) is a common problem in many shallow Wisconsin lakes. A kill can occur when at least four inches of snow cover the lake, which

prevents sunlight from reaching the water. All photosynthesis stops and plants begin to die and decompose. The extent of oxygen loss depends on the total amount of plant, algae and animal matter that decays. Drought increases the chance of winterkill by reducing the volume of water in the lake. A “Y” indicates the lake has experienced winterkill at least once. If blank, winterkill is not known to have occurred.

Access:

BR = Boat Ramp	P = Barrier-free pier (wheelchair access)
T = Walk-in trail	NW = Navigable water access to lake
R = Roadside	BW = Barrier-free wilderness access (wheelchair access)
W = Wilderness	X = Some type of access available, but not specified
BF = Barrier-free boat ramp (boating dock and/or wheelchair access)	

SH (Self-Help Monitoring): This column identifies existing or recommended Self-Help monitoring. The following letters in each column signify that Self-Help monitoring is:

- R** = recommended
- X** = completed
- C** = currently being done

HG (Mercury): Because all fish contain some mercury, the state gives general statewide advice about how much fish to eat. This advice can be used for most inland (i.e. non-Great Lakes) waters of the state. Certain lakes contain fish with higher levels of mercury for which special advice is given. These consumption advisories are issued annually for lakes with fish mercury levels of 1.0 parts per million (ppm) or greater. Generally, predator fish from soft water, poorly buffered, low pH lakes have the highest concentrations of mercury. The most updated listing of waterbodies with fish consumption advisories can be obtained by writing to: Fish Advisory, Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, WI 53707.

- R**= Fish mercury monitoring is recommended.
- M**= Monitoring has been conducted and this waterbody falls under a general statewide fish consumption advisory for mercury.
- SA**= *(special advisory) Monitoring has been conducted and a special advisory exists for this body of water.*

MAC (Macrophytes): This column identifies the status of macrophytes or aquatic plants in the lake. Specifically, it indicates if the lake experiences Eurasian water milfoil and/or purple loosestrife, two invasive non-native species of plants that can impair the lake's aesthetic, ecological, and recreational values.

- EWM** = indicates that Eurasian water milfoil is present in the lake and may be a problem
- EM-W** = lake part of research project to study the effectiveness of Eurasian water milfoil weevil in reducing and/or eradicating this plant from the lake.

PL = indicates that purple loosestrife is present in the lake and may be a problem

LMO (Lake Management Organization): Indicates whether or not a lake management organization (LMO) exists for the lake. An LMO can range from a small, loosely organized group of lake property owners to an association to a district, complete with by-laws and taxing authority. In the Lake Tables, the following letters are used to indicate whether the LMO is an association or district. If the type of organization is not known, but one does exist, a “Y” is used.

ASSC= Indicates that a lake management association exists

DIST= Indicates that a lake management district exists

R= Recommends that a LMO be developed; this recommendation is usually accompanied by a narrative recommendation in the watershed analysis section.

Trophic status index (TSI) class: Lakes can be divided into three categories based on trophic state: oligotrophic, mesotrophic and eutrophic. These categories are general indicators of lake productivity.

Oligotrophic: (*TSI is less than or equal to 39*) Oligotrophic lakes are generally clear, cold and free of many rooted aquatic plants or large blooms of algae. Because they are low in nutrients, oligotrophic lakes generally do not support large fish populations. However, they often have an efficient food chain with a very desirable fishery of large predator fish.

Mesotrophic: (*TSI is between 40 and 49*) Mesotrophic lakes are in an intermediate stage between oligotrophic and eutrophic. The bottoms of these lakes are often devoid of oxygen in late summer months, limiting cold water fish and resulting in phosphorus cycling from sediments.

Eutrophic: (*TSI equal to or greater than 50*) Eutrophic lakes are high in nutrients. They are likely to have excessive aquatic vegetation or experience algae blooms, sometimes both. They often support large fish populations, but are also susceptible to oxygen depletion. Small, shallow lakes are especially vulnerable to “winterkill,” which can reduce the number and types of fish.

All lakes naturally age, or progress from being oligotrophic to eutrophic. In many places, people have accelerated this process by allowing nutrients from agriculture, lawn fertilizers, streets, septic systems, and urban storm drainage to enter lakes.

Lake Plan or Prot: This column refers to whether the lake has been the recipient of a lake planning or lakes protection grant in the past and if either of these grants are recommended for the lake. If a lakes planning or protection grant is recommended, a narrative in the lake's respective watershed section will describe the recommended purpose of the grant.

PLAN = Lake has received a Lakes Management Program Planning Grant in the past.

PROT = Lake has received a Lakes Management Program Protection Grant in the past.

PLAN-R = A Lakes Management Planning Grant is recommended for a specific purpose identified in the lake's individual narrative in the Surface Water Quality Report watershed section.

PROT-R = A Lakes Management Protection Grant is recommended for a specific purpose identified in the lake's individual narrative in the Surface Water Quality Report watershed section.

Phosphorus Sensitivity (P SENS): This analysis classifies lakes according to their relative sensitivity to phosphorus loading and existing trophic condition. The screening identifies high quality lakes that should receive highest priority for nutrient control management. The analysis first separates lakes into two major categories; lakes that are sensitive to increased phosphorus loading (Class I) and lakes less responsive to changes in phosphorus loading (Class II). Lakes in each general classification are then subdivided into management groups based on data needs or existing water quality conditions.

Class I:

A = existing water quality fair to excellent; potentially most sensitive to increased phosphorus loading.

B = existing water quality poor to very poor; less sensitive to increased phosphorus loading than Group A.

Ins = data is inadequate or insufficient to assess trophic condition; classification monitoring recommended.

Class II:

A = existing water quality fair to excellent; may not be as sensitive to phosphorus loading as Class I lakes.

B = existing water quality poor to very poor; low sensitivity to increased phosphorus loading.

Ins = data inadequate or insufficient to assess trophic condition.

These classification groups are used to establish appropriate management recommendations and priorities.

Comments: Additional information that was available for the lakes has been included in the comments column. Abbreviations were used to conserve space as follows:

Source – (Cause of problem). This is the source of threat or impairment.

AGSPR - Agricultural land spreading site

NPS - Unspecified nonpoint sources

CL - Cropland erosion

SB - Streambank erosion

PSB - Streambank pasturing

PWL - Woodlot pasturing

HM - Hydrological modification (dam, ditching, wetland drainage)

CE - Building construction site erosion

RS - Roadside construction erosion

SEP - Septic systems

URB - Urban storm water runoff

DEV - Intense development pressure

WLF - Water level fluctuations

BY - Barnyard or exercise lot

Causes/Stressors - causes are those pollutants or other conditions that contribute to the impairment of designated uses in a lake. Stressors are factors or conditions - other than specific pollutants - that cause impairment of designated uses in a lake.

HAB - Habitat

TURB - Turbidity

DO - low dissolved oxygen

ACC - Access problems relate to the general public's inability to access the lake

ALG - Undesirable algae growth

NUT - Nutrient enrichment

SED - Sedimentation

TOX - General toxicity problems

APPENDIX L: COUNTY LAND AND WATER RESOURCE MANAGEMENT PLANS

Starting in 1997, all of the counties in Wisconsin were required to develop a county land and water resource management plan. These plans address the soil and water quality concerns in the county as well as the federal, state and local programs that exist to address these concerns. Each county identifies its major resource concerns and goals to be addressed in the next five years. The plan also focuses on the importance of partnerships in effectively addressing resource concerns.

The counties that make up the Lower Wisconsin River Basin have each developed their land and water resource management plans. Many of the resource issues identified in each plan are similar to those found in other county plans. Below, you will find the top 10 resource issues and needs of counties in the Lower Wisconsin River Basin as identified by the County Land and Water Management Plans.

- ◆ The need for more funding to conduct conservation programs.
- ◆ The need for improved agricultural practices.
- ◆ The need for better forestry and woodlot management.
- ◆ The need to protect groundwater resources.
- ◆ The need for a better information and education strategy.
- ◆ The need for land use planning and to address development issues.
- ◆ The need to foster effective partnerships.
- ◆ The need to protect and improve surface water resources.
- ◆ The need for proper disposal of solid and hazardous wastes.
- ◆ The need to protect and restore wildlife habitat and native plant communities.

To find more specific objectives, see the table below. For more information as well as the action each county plans to take to address these 10 issues, see the county's land and water resource management plan.

General Resource Objectives and Goals as Listed in County Land and Water Resource Plans

Resource Concerns/Goals	Adams	Columbia	Crawford	Dane	Grant	Iowa	Jackson	Juneau	Monroe	Richland	Sauk	Vernon
Agricultural Practices												
Control overgrazing and streambank erosion along streams/rivers		x										x
Cropland erosion control	x	x	x	x	x	x	x	x	x	x		x
Guidelines for Large Farms				x		x					x	
Reduce environmental risks to surface water by improving nutrient management	x	x		x		x	x		x	x	x	
Reduce environmental risks to water quality through proper animal waste management	x	x	x	x	x	x	x	x	x	x	x	
Forestry and Woodlot Management												
Plant trees					x	x						x
Promote participation in forestry programs and the economically and environmentally sound management of forests and woodlots			x		x	x			x		x	
Funding Projects and Providing Cost Share												
Need more funding for conservation practices	x		x	x	x	x			x		x	
Inadequate water resource tools, education & funding results in lack of protection of surface and groundwater	x				x	x						
Need more cost share from state/county sources	x		x		x	x	x			x		x
Groundwater Concerns												
Failing septic systems	x							x				x
Protect and improve groundwater resources	x	x	x	x		x				x	x	
Properly abandon unused wells		x	x	x				x		x	x	
Develop wellhead protection plans											x	
Information and Education Needs												
Educate urban and rural residents and absentee landowners on water quality issues	x		x	x						x		
Educate landowners and urban residents and absentee landowners on how to reduce erosion	x		x	x	x	x		x		x		
Educate landowners and those involved in the logging industry on sustainable forestry	x		x			x			x			
Improve coordination and education regarding natural resource issues including solid waste disposal, wetlands, etc.	x		x	x	x	x	x		x		x	x

Land Use/Land Change and Development													
Changing land use and loss of "ag" land	x												
Land use planning	x												
Protect sensitive natural places and areas of exceptional beauty													
Reduce erosion on land other than cropland													
Runoff from impervious surfaces/stormwater	x												
Uncontrolled erosion from subdivision/construction site	x												
Fostering Effective Partnerships													
Need increased citizen participation													
Need to target priority areas													
Work with other agencies and landowners on projects													
Protecting and Improving Surface Waters													
Develop a strategy for improving and protecting the quality of ERW/ORW and 303(d) waters													
Improve cold water and other fisheries	x												
Protect wetlands by eliminating their loss and degradation and encourage the restoration of wetlands													
Reduce sediment delivery to surface waters	x												
Retain and restore vegetative buffers and riparian areas on waterways	x												
Streambank stabilization	x												
Surface water protection	x												
Solid Waste Disposal													
Protect the environment by the proper disposal of unwanted solid and hazardous products including recyclables and carcasses	x												
Wildlife Habitat & Native Plant Communities													
Better ways to deal with wildlife damage (compensation, animal removal)													
Preserve and restore wildlife habitat and prevent fragmentation	x												
Reduce populations of invasive species	x												

